A MONOGRAPH

OF THE

CULICIDAE

OR

MOSQUITOES.

MAINLY COMPILED FROM COLLECTIONS RECEIVED AT

THE BRITISH MUSEUM.

BY

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VOL. IV.

LONDON:

PRINTED BY ORDER OF THE TRUSTEES.

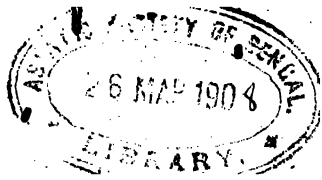
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1907.



595.733
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(vol-4)

LONDON:
PRINTED BY WILLIAM CLOWES AND SONS, LIMITED,
DUKE STREET, STAMFORD STREET, S.E., AND GREAT WINDMILL STREET, W.

Sl. No. 088320

19006

PREFACE.

THE present volume is the second one supplementary to Mr. Theobald's original work on the *Culicidæ*, in two volumes, with an atlas of plates, published by the Trustees in 1901. As was to be anticipated, the first publication of a systematic treatise on the blood-sucking gnats, and the sending of requests to all parts of the world for specimens, have resulted in an enormous and rapid increase of knowledge. The first two volumes (the original work), published in 1901, described 289 species, of which 114 were new to science, and was based on a collection of about 5,000 specimens. The first supplementary volume (Vol. III.) described numerous additional species, of which 88 were for the first time described in that volume. It was based on additional collections received since the completion of the original work, numbering 4,200 specimens. The present volume (Vol. IV., second supplementary volume) includes 160 species described since 1903, when the last volume went to press. Seventy-three additional species are described in this volume for the first time. About 12,000 specimens have been received in this Museum since 1903, but it has not been possible to examine more than half that number for report in the present volume. A fifth volume (third supplementary volume) is in active preparation.

The importance of the accurate study and discrimination of the various species of insects which suck the blood or other juices of man and animals, and may thus become carriers of disease-producing parasites, has determined the Trustees of the British Museum to endeavour to obtain as complete collections as possible of blood-sucking insects and arachnids from all parts of the world, with a view to the production of further monographs on such flies, fleas, bugs, lice, ticks and acarids as may be agents in the spread of disease.

In carrying out such a task there is no reason why the British Museum should undertake every section, and it is to be

hoped that other great national museums may join in the scheme and make use of our collections for the purpose as well as of other collections. Thus the interesting group of minute midge-gnats—the *Simuliidae*—is being monographed by M. Roubaud, of Paris, and our collections of *Simuliidae* have been sent to him and described in his monograph.

Whilst awaiting the preparation of complete technical monographs on these insects, such as those already issued relating to the Gnats, written by Mr. Theobald, to the Tsetze Flies, written by Mr. E. E. Austen, and that undertaken by M. Roubaud, dealing with the *Simuliidae*, a series of publications intended to assist the collector and student of blood-sucking insects has been commenced by the Trustees of the British Museum, which is entitled, "Illustrations of Blood-sucking Flies." Separate volumes are in preparation which will deal respectively with African, Indian, Australasian, North American, and South American representatives of these flies in a simple way, whilst coloured illustrations accompany the text. A first volume of this series, prepared by Mr. E. E. Austen, has already been issued by the Trustees entitled, "Illustrations of British Blood-sucking Flies."

Those who desire to assist in the work thus sketched by sending collections, coloured drawings or notes upon the habits of blood-sucking insects are invited to communicate by letter with the Director of the Natural History Departments (British Museum), Cromwell Road, London, S.W.

E. RAY LANKESTER,

Director.

INTRODUCTION.

THE present volume deals almost exclusively with new species added since 1903, and at the same time fresh localities and notes are given of previously known mosquitoes.

Owing to the amount of work done during the past two years it has been found quite impossible to include in this volume a large amount of information gathered together during the last year. This we hope will be dealt with in a future volume.

The number of specimens received since the appearance of the last volume has been about twelve thousand, and nearly half of these have not as yet been examined. Although a large number are well known species there are apparently many new to science amongst them.

In this volume one hundred and sixty species are included which have been described since 1903 and seventy-three new species are described here.

Since this volume went to press a large number of new mosquitoes have been described from America and the West Indies; many of which seem to be based on insufficient characters. There seems to be a growing tendency to create species upon a few colour variations, especially when they have been found in different localities. It is very doubtful if some of these are more than local varieties of known species. If the frail characters upon which many species are being founded are applied to the large series of *Culex fatigans* or of *Stegomyia fasciata* from all parts of the world in the Museum collection, the series would be split up into a very large number of species, and yet every gradation could be found between the two extremes in the series.

Moreover, in America, Messrs. Dyar and Knab have started "species-making" out of larvae of which the adults are not known. Sooner or later the adults may be described or the named larvae may be fixed to the already described adults, and

then we shall have the *Culicidae* in the unsatisfactory position of having dual names. Surely the synonomy is bad enough already without this.

Again, it must be pointed out, that the larval characters which have been chosen for descriptive work are by no means as stable as one has been led to believe.

The main characters taken are the number and form of the "scales" of the comb and pecten in *Culicines*, and the frontal hairs in *Anophelines*, also the form of the siphon in the former.

Any one who has examined a large series of any larvae will notice a wide range in these characters, not only in different stages of the same species, but in the same species in the same stage. It is quite possible that we may have the larva of one species being described as several different species.

The enormous amount of material at disposal since the inception of this volume has still further shown the value of scale structure, not only for diagnostic work but also as a means of true or natural classification, for it is found that grouping by these characters aided by others of minor importance such as the male genitalia and palpal structure agrees with what we know of their bionomics. The various new methods of classification suggested by other workers are referred to on pages 9 to 17.

With the exception of the adoption of a few characters in an admirable theme of general classification drawn up by Dr. Lutz, no changes have been made in this volume.

The exclusion of the *Corethrinae* and their elevation to family rank was suggested in the first volume (p. viii.).

Some alterations have been made in regard to the terms used in the description of the leg. The metatarsus is called the first tarsal, and the more distal segments are called tarsal segments, or tarsals. The original descriptions of other workers have also been altered in this respect. What has been previously called the first tarsal must now unfortunately be called the second tarsal, and so on.

It was hoped at one time that all recent literature on this subject might have been incorporated as a bibliography, but the amount of writing during the past three years has been so great that it is impossible. The literature on this subject is now so voluminous that it might well be issued as a separate volume.

Amongst the most important works that have appeared since 1903, we must mention the following:—"Os Mosquitos no Parà," by Dr. E. A. Goeldi (1905); "Mosquitos do Brazil," by Celestino

Bourroul (and Dr. Lutz) (1904); "The Mosquitoes of New York State," by Professor E. P. Felt (1904); "The Mosquitoes of New Jersey," by Professor J. B. Smith (1905); "Mosquito Notes," by Miss Ludlow (Canadian Entomologist, 1903–1906), mainly dealing with species from the Philippine Islands; "A Catalogue of *Culicidae* in the National Museum of Hungary," by F. V. Theobald (1905); "Family *Culicidae* in Genera Insectorum," by F. V. Theobald (1905); and numerous papers by W. D. Coquillett, M. Ventrillon, Dr. Edmond Sergent, C. S. Banks, and Messrs. Dyar and Knab.

A large and valuable manuscript was shown me some time ago, "The Mosquitoes of Malaya," by Dr. Leicester, in which many new species were described. This unfortunately has not yet been issued.

Dr. Raphael Blanchard has compiled a large and valuable work entitled, "Les Moustiques. Histoire Naturelle et Médicale" (1905), in which is collected most available material up to the date of publication. It is of especial value for correcting errors in nomenclature and has the most complete bibliography yet compiled.

Many other papers of minor importance have appeared and have been referred to in the text.

Amongst the most valuable collections received have been those from Brazil sent by Drs. Goeldi, Lutz and Fajardo; from North America by Professors E. P. Felt and Glenn-Herrick; from the West Indies by Dr. Grabham. From the Transvaal large collections have been sent in connection with the malarial investigations along certain of the railroads by the Government Entomologist, Mr. Simpson. Other large collections have come from Africa through the kindness of Dr. Andrew Balfour, Mr. F. Willcocks, Dr. Aubrey Hodges, Major F. Smith, R.A.M.C., and others. Several collections have been received from Ceylon from Mr. Ernest Green and many from India, notably from Major C. G. Nurse and Major J. R. Adie, I.M.S. (the latter only received by me since this work went to press contains much *Anopheline* material).

Much of interest has been sent by M. Ventrillon from Madagascar and by Dr. Edmond Sergent from Algeria. Amongst others who must be thanked for sending collections and specimens from various parts are the Earl of Crawford, K.C.B.; Dr. Barker, P.M.O., British North Borneo; Professor Ronald Ross, C.B.; Dr. Vassal; Mr. Cornford; Capt. E. D. W. Greig, I.M.S.;

Dr. W. F. Thornton; Mr. P. R. Dupont; Dr. Bancroft; Mr. E. Stoehr; Dr. H. Strachan; Dr. Power; Dr. Oswald Cruz; Dr. Leicester, and many others.

My thanks are especially due to Miss Ludlow and Mr. C. Banks for sending me their co-types, and to the former for much valuable aid and in keeping me informed of all new discoveries made in her wide sphere of work, and also to Dr. L. O. Howard, Chief of the Bureau of Entomology, U.S.A.

Lastly I must express my thanks to Mr. S. Rothwell and Mr. C. O. Waterhouse, for kindly reading over the proofs of this volume, and to the many correspondents in all parts of the world for their kind interest and help.

The original illustrations have all been prepared by Miss C. Beard, those reproduced, by Mr. Eric Molecey; the photographs have been taken by Mr. Edenden and Mr. Hammond.

FRED. V. THEOBALD.

November 10th, 1906.

Note.—Plates iii. and iv. in vol. iii. were reproduced from drawings by D. A. Turkhud, M.B., and were unfortunately not acknowledged at the time.

LIST OF ILLUSTRATIONS IN VOL. IV.

FIG.

1. Diagram of larva. p. 5.
2. Diagram of ♂ genitalia. p. 8.
3. *Anopheles punctipennis*, Say. Head, antenna and labial plate (after Smith). p. 28.
4. Labial plate of *A. punctipennis* (after Felt). p. 28.
5. *Anopheles crucians*, Wied. Head, antenna, and labial plate of larva (after Smith). p. 29.
6. Wing of *Anopheles corethroides*. ♀. n. sp. p. 35.
7. Wing of *Anopheles smithii*. Theobald. ♀. p. 39.
8. A. *Myzomyia funesta*, Giles; B. *M. nili*, Theobald. Apex of ♀ antennae. p. 43.
9. Male genitalia of *Myzomyia nili*, Theobald. p. 45.
10. Male genitalia of *Myzomyia funesta*, Giles. p. 46.
11. Wing of *Myzomyia pyretophoroides*. n. sp. ♂. p. 49.
12. Wing of *Myzomyia pyretophoroides*. n. sp. ♀. p. 50.
13. Larval characters of *Cycloleppteron grabhamii*, Theobald. p. 56.
14. Male genitalia of *Feltinella pallidopalpi*. n. sp. p. 57.
15. Wing of *Feltinella pallidopalpi*. n. sp. ♂. p. 58.
16. Wing of *Pyretophorus sergentii*. n. sp. ♀. p. 69.
17. Wing of *Pyretophorus myzomyifacies*. n. sp. ♀. p. 70.
18. Wing of *Pyretophorus austenii*, Theobald. n. sp. ♀. p. 72.
19. Wing of *Myzorhynchella nigra*. n. sp. ♀. p. 79.
20. Head of ♀ *Myzorhynchus strachanii*. n. sp. p. 85.
21. *Cellia albimana*, Wiedemann. Larval head, palp and labial plate. p. 107.
22. *Cellia albimana*, Wiedemann. Palmate hairs, antenna and frontal hairs. p. 108.
23. Wing of *Neocellia indica*. n. sp. ♀. p. 112.
24. Wing of *Neocellia dudgeonii*. n. sp. ♀. p. 114.
25. Wing of *Neocellia intermedia*. n. sp. ♀. p. 117.
26. *Kertészia boliviensis*, Theobald. ♀. Thoracic markings; front of mesothorax and abdominal scales. p. 118.
27. Wing of *Kertészia boliviensis*, Theobald. ♀. p. 119.
28. *Bironella gracilis*, Theobald. Head scales. p. 120.
29. Wing of *Bironella gracilis*, Theobald. ♂. p. 122.
30. Ova of *Megarhinus separatus*, Arri. (after Goeldi); enlarged. p. 130.
31. Ova of *Megarhinus separatus*, Arri. (after Goeldi); still further enlarged. p. 130.
32. *Megarhinus herrickii*. n. sp. ♂. Theobald. Palp and proboscis. p. 132.

FIG.
33. Larva of *Megarhinus herrickii*. n. sp. (After Glenn-Herrick.) p. 132.
34. Head of larva of *Megarhinus herrickii*. n. sp. p. 132.
35. Caudal end of pupa of *Megarhinus herrickii*. n. sp. p. 132.
36. Wing of *Megarhinus solstitialis*, Lutz. ♀. p. 134.
37. Wing of *Megarhinus solstitialis*. Lutz. ♂. p. 135.
38. Head of larva of *Megarhinus solstitialis*. Lutz. p. 135.
39. Wing of *Megarhinus chrysocephala*. n. sp. ♂. p. 137.
40. End of ovum of *Janthinosoma lutzii*, Theobald (after Goeldi). p. 153.
41. Ovum of *Janthinosoma sayi*, Theobald (after Goeldi). p. 153.
42. Larval characters of *Janthinosoma sayi*. nov. nom. (After Felt.) p. 156.
43. Larval mandible of *Psorophora ciliata* (after Felt). p. 160.
44. Comb of *Psorophora ciliata* (after Felt). p. 160.
45. Comb scales of *Psorophora ciliata* (after Felt). p. 161.
46. Labial plate of *Psorophora ciliata* (after Felt). p. 161.
47. Head of larval *Desvoidya obturbans*, Walker. p. 164.
48. Siphon of larva of *Desvoidya obturbans*, Walker. p. 164.
49. Wing of *Quasistegomyia unilineata*, Theobald. ♀. p. 167.
50. *Stegomyia fasciata*, Fabricius. Labial plate of larva; caudal fan of pupa; siphon of pupa; antenna of larva. p. 178.
51. *Stegomyia W- alba*, Theobald. A. Thorax; B. Head; C. Femora of ♀. p. 181.
52. Male genitalia of *Stegomyia simpsoni*, Theobald. p. 183.
53. Wing of *Stegomyia mediopunctata*, Theobald. ♀. p. 188.
54. Antennal segments of ♂ *Carrollia irridescens*, Lutz. p. 207.
55. Wing of *Carrollia irridescens*, Lutz. ♂. p. 208.
56. Larval characters of *Howardina walkeri*, Theobald (after Grabham). p. 216.
57. Wing of *Howardina aurites*, Theobald. ♀. p. 217.
58. Cephalic and scutellar adornment of *Pseudohowardina trivittata*, Coquillett. ♀. p. 224.
59. Wing of *Pseudohowardina trivittata*. ♀. Coquillett. p. 225.
60. Larval characters of *Pseudohowardina trivittata*, Coquillett. p. 226.
61. *Culiciomyia inornata*, Theobald. Head of ♀ and ♂ and ♀ scutellum. p. 228.
62. Wing of *Culiciomyia inornata*. ♀. Theobald. p. 229.
63. Male genitalia of *Culiciomyia inornata*, Theobald. p. 230.
64. Wing of *Culiciomyia annulata*. ♀. n. sp. p. 231.
65. Male genitalia of *Culiciomyia annulata*. p. 232.
66. *Culiciomyia pulla*. ♀. Theobald. Cephalic ornamentation. p. 233.
67. Wing of *Culiciomyia freetownensis*. ♂. Theobald. p. 234.
68. *Culiciomyia freetownensis*, Theobald. Male clasper; foliate plate of ♂; female palp and apex of male palp. p. 234.
69. Wing of *Culiciomyia freetownensis*. ♀. Theobald. p. 235.
70. Wing of *Culiciomyia ceylonica*. ♀. n. sp. p. 237.
71. Male palp and proboscis of *Danielsia*. p. 240.
72. Cephalic and scutellar adornment of a *Danielsia*. p. 241.
73. Wing of *Danielsia mediolineata*. ♀. n. sp. p. 246.
74. Wing of *Danielsia tripunctata*. ♀. n. sp. p. 248.
75. Wing of *Gnophodeomyia inornata*. ♀. Theobald. p. 253.
76. Head and scutellum of *Protomacleaya triseriata*. ♀. Say. p. 254.

FIG.
77. Wing of *Protomacleaya triseriata*. ♀. Say. p. 255.
78. *Protomacleaya triseriata*, Say. Larval characters. p. 256.
79. Male fore ungues of *Reedomyia niveoscutella*, Theobald. p. 261.
80. Wing of *Reedomyia alboscutella*. ♀. Theobald. p. 262.
81. Male genitalia of *Reedomyia biannulata*. p. 264.
82. Wing of *Pecomyia maculata*. ♀. Theobald. p. 266.
83. Wing of *Pecomyia maculata*. ♀. Theobald. p. 267.
84. Another wing of *Pecomyia maculata*. ♀. Theobald. p. 267.
85. Male genitalia of *Pecomyia maculata*, Theobald. p. 268.
86. Wing of *Pecomyia caeca*. ♀. Theobald. p. 269.
87. Male genitalia of *Pseudotheobaldia niveitaeniata*. p. 272.
88. Wing of *Pseudotheobaldia niveitaeniata*. ♂. n. sp. p. 273.
89. Wing of *Megaculex albitarsis*. ♀. Theobald. p. 284.
90. Larva of *Grabhamia jamaicensis*, Theobald (after Glenn-Herrick). p. 285.
91. Larval characters of *Grabhamia jamaicensis*, Theobald. p. 286.
92. *Grabhamia jamaicensis*. Labial plate with hair on same (after Felt). p. 287.
93. Two forms of pecten of *Grabhamia jamaicensis*, Theobald (after Felt). p. 287.
94. Comb and mid spine of comb of *Grabhamia jamaicensis*, Theobald (after Felt). p. 288.
95. *Grabhamia jamaicensis*. Larval siphon. p. 288.
96. Larval characters of *Grabhamia pygmaea*, Theobald. p. 290.
97. Labial plate. *Grabhamia sollicitans* (after Felt). p. 292.
98. *Grabhamia sollicitans*, Walker. Larval characters (after Smith). p. 293.
99. Wing of *Grabhamia willcocksii*. ♀. n. sp. p. 297.
100. Male genitalia of *Grabhamia willcocksii*. n. sp. p. 297.
101. Male genitalia of *Grabhamia mariae*, Sergent. p. 298.
102. Apex of wing of *Grabhamia pulcritarsis*. ♀. Rondani. p. 302.
103. Head of *Grabhamia longisquamosa*. ♀. Theobald. p. 303.
104. Wing of *Grabhamia flavifrons*. ♀. Skuse. p. 306.
105. *Grabhamia discolor*, Coquillett. Larval characters. p. 310.
106. *G. discolor*. Antenna and labial plate. p. 311.
107. Female palp, head and enlarged cephalic scale of *G. maculosa*, Theobald. p. 312.
108. Wing of *Grabhamia maculosa*. ♀. Theobald. p. 313.
109. Wing of *Pseudograbhamia maculata*. ♀. Theobald. p. 315.
110. Wing of *Aporoculex punctipes*. ♀. n. sp. p. 318.
111. Cephalic and thoracic adornment of (a) *Culicada subcantans*, Felt; (b) *C. fitchii*, Felt; (c) *C. abfitchii*, Felt. p. 321.
112. Wing of *Culicada fitchii*. ♀. Felt. p. 322.
113. *Culicada fitchii*. Air tube (Felt) and pecten tooth. p. 323.
114. Comb scale of *C. fitchii* (Felt). p. 323.
115. Siphon of *Culicada subcantans* (after Felt). p. 325.
116. Labial plate of *C. subcantans* (after Felt). p. 326.
117. Comb of larva of *Culicada subcantans* (after Felt). p. 327.
118. *Culicada subcantans*, Felt. Larval characters. (After Smith.) p. 327.
119. Wing of *Culicada abfitchii*. ♀. Felt. p. 329.
120. *Culex siphonalis*, Grossbeck. Larval characters. (Smith.) p. 331.

FIG.
121. Male genitalia of *Culicada waterhousei*, Theobald. p. 338.
122. *Culicada cantator*, Coquillett. Larval characters. (After Smith.) p. 335.
123. Wing of *Culicada nipponii*. ♀. n. sp. p. 338.
124. *Culicada minuta*. n. sp. (Base of antenna.) p. 339.
125. *Culicada canadensis*, Theobald. Larval characters. (After Smith.) p. 342.
126. Wing of *Culicada fluviatilis*. ♀. Lutz. p. 343.
127. *Culicada bupengaryensis*, Theobald. Male and female ungues. p. 349.
128. Wing of *Culicada bupengaryensis*. ♀. Theobald. p. 349.
129. *Culicada bupengaryensis*, Theobald. Male genitalia and female palp. p. 350.
130. Wing of *Culicada aurifer*. ♀. Coquillett. p. 352.
131. *Culicada aurifer*, Coquillett. Larval characters. (After Smith.) p. 353.
132. Wing of *Culicada pretans*. ♀. Grossbeck. p. 355.
133. *Culicada pretans*, Grossbeck. Larval characters. (After Smith.) p. 356.
134. Wing of *Culicada trichura*. ♀. Dyar. p. 358.
135. Wing of *Culicada trichura*. ♂. Dyar. p. 358.
136. Wing of *Culicada lazarensis*. ♀. Felt. p. 361.
137. Comb of *Culicada lazarensis* (after Felt). p. 362.
138. Labial plate of *C. lazarensis*. Felt. p. 362.
139. Pecten teeth of *C. lazarensis* (after Felt). p. 362.
140. Siphon of larval *C. lazarensis*, Felt (after Felt). p. 363.
141. Comb scales of *C. lazarensis*, Felt (after Felt). p. 363.
142. Wing of *Culicada abserrata*. ♀. Felt. p. 365.
143. Combs of *Culicada abserrata*, Felt (after Felt). p. 366.
144. Air siphon of *Culicada abserrata* (after Felt). p. 366.
145. Labial plate of *C. abserrata* (after Felt). p. 366.
146. Male genitalia of *C. cinereoborealis*, Felt (after Felt). p. 367.
147. Comb of *C. cinereoborealis* (after Felt). p. 368.
148. Air-tube of *Culicada cinereoborealis* (after Felt). p. 369.
149. Wing of *Culicada nemorosa*. ♀. Meigen. p. 371.
150. Wing of another *Culicada nemorosa*. ♀. Meigen. p. 371.
151. Wing of *Culicada pinctor*. ♀. Kirkby. p. 371.
152. Palp of ♀ *Leucomyia gelida*, Theobald. p. 372.
153. Male palp of *Leucomyia gelida*, Theobald. p. 373.
154. Male genitalia of *Leucomyia gelida*, Theobald. p. 373.
155. *Culiselsa taeniorhynchus*, Wiedemann (after Smith). Larval characters. p. 378.
156. Wing of *Culiseta absobrina*. ♀. Felt. p. 384.
157. Wing of *Culiseta absobrina*. ♂. Felt. p. 385.
158. Comb scale of *Culiseta absobrina*. p. 386.
159. Larval antenna of *Culiseta absobrina* (after Felt). p. 386.
160. Siphon of *Culiseta absobrina* (after Felt). p. 386.
161. Labial plate of *C. absobrina*, Felt (after Felt). p. 386.
162. Wing of *Culex vishnui*. ♀. Theobald. p. 387.
163. Male genitalia of *Culex vishnui*, Theobald. p. 388.
164. Wing of *Culex birói*. ♀. Theobald. p. 390.
165. Wing of *Culex birói*. ♂. Theobald. p. 391.
166. Larval characters of *Culex secutor*, Theobald. p. 397.

FIG.
167. Wing of *Culex quasisecutor*. ♀. Theobald. p. 399.
168. Another wing of *Culex quasisecutor*. ♀. Theobald. p. 399.
169. Male genitalia of *Culex quasisecutor*, Theobald. p. 400.
170. *Culex atropalpus*, Coquillett. Larval characters. (Smith.) p. 402.
171. Male genitalia of *Culex subfuscus*. n. sp. p. 404.
172. *Culex sylvestris*, Theobald. Larval characters. (After Smith.) p. 405.
173. Labial plate of *Culex sylvestris*, Theobald (after Felt). p. 406.
174. *Culex nivitarsis*, Coquillett. Larval characters. (After Smith.) p. 409.
175. Wing of *Culex pallidostriatus*. ♂. n. sp. p. 411.
176. Wing of *Culex dyari*. ♀. Coquillett. p. 413.
177. Wing of *Culex dyari*. ♂. Coquillett. p. 413.
178. Male genitalia of *Culex dyari*, Coquillett. p. 414.
179. *Culex restuans*, Theobald (after Felt). Pecten teeth. p. 418.
180. Labial plate of *C. restuans*, Theobald (after Felt). p. 418.
181. Siphon and anal appendages of (1) *Culex territans*, Walker; (2) *Culex restuans*, Theobald (after Felt). p. 418.
182. Wing of *Culex stoehri*. ♀. n. sp. p. 420.
183. Wing of *Culex salinarius*. ♀. Coquillett. p. 422.
184. *Culex salinarius*, Coquillett. Larval characters. (After Smith.) p. 423.
185. *Culex bifoliata*, Theobald. Male genitalia. p. 426.
186. Male genitalia of *Culex bifoliata*, Theobald. p. 426.
187. Thorax of *Culex trimaculatus*. ♀. p. 427.
188. Wing of *Culex neavei*. ♀. Theobald. p. 430.
189. Wing of *Culex rubinotus*. ♀. Theobald. p. 432.
190. Wing of another *Culex rubinotus*. ♀. Theobald. p. 432.
191. Denuded wing of *Culex rubinotus*. ♀. Theobald. p. 432.
192. Wing of *Culex pallidocephala*. ♀. Theobald. p. 435.
193. Apex of wing of another *Culex pallidocephala*. ♀. p. 435.
194. *Culex inconspicuus*, Grossbeck. Larval characters. (After Smith.) p. 438.
195. Male genitalia of *Culex osakaensis*. n. sp. p. 441.
196. *Culex simpsoni*, Theobald. (♂ genitalia.) p. 443.
197. *Culex minutus*, Theobald. (♂ genitalia.) p. 446.
198. Wing of *Culex territans*. ♀. Walker. p. 449.
199. Labial plate of *C. territans*, Walker (after Felt). p. 450.
200. *Culex territans*, Walker. Larval characters. (After Smith.) p. 451.
201. Male genitalia of *Culex spinosus*, Lutz. p. 455.
202. *Culex palus*, Theobald. ♂ genitalia. p. 456.
203. Wing of *Culex lateropunctata*. ♀. n. sp. p. 458.
204. *Protoculex serratus*, Theobald. Larval characters. (After Smith.) p. 464.
205. *Protoculex* (?) *dupreei*, Coquillett. Larval characters. (After Smith.) p. 468.
206. Wing of *Banksinella luteolateralis*. ♀. Theobald. p. 469.
207. Head of a male *Lophoceratomyia fraudatrix*, Theobald. p. 472.
208. Female and male palp of *L. fraudatrix*. p. 475.
209. Wing of *Lophoceratomyia fraudatrix*. ♀. Theobald. p. 475.
210. Antennal organs of *Lophoceratomyia fraudatrix*. ♂. Theobald. p. 476.

FIG.
211. Wing of *Lophoceratomyia fraudatrix*. ♂. Theobald. p. 476.
212. *Lophoceratomyia brevipalpa*, Theobald. Male proboscis and palpi; basal segment of antennae; antennal organs and male ungues. p. 477.
213. *Trichopronomyia annulata*. ♂. Theobald. Apex of proboscis and scales in front of wing. p. 480.
214. Wing of *Trichopronomyia annulata*. ♂. Theobald. p. 480.
215. Squamose cephalic adornment of *Trichopronomyia microannulata*. Theobald. p. 481.
216. Male palp of *T. microannulata*. p. 482.
217. Egg mass of *Taeniorhynchus arribalzagae*, Theobald (after Goeldi). p. 483.
218. Ova of *Taeniorhynchus fasciolatus* (after Goeldi). p. 483
219. Siphon of *T. fasciolatus* (after Goeldi). p. 484.
220. Wing of *Taeniorhynchus walsinghamii*. ♀. n. sp. p. 485.
221. Wing of *Taeniorhynchus tenax*, Theobald. Var. *ocellatus*. ♀. p. 489.
222. Ova of *Chrysoconops fulvus* as laid and breaking up (after Goeldi). p. 493.
223. Ova of *Chrysoconops fulvus* (after Goeldi). p. 493.
224. Ova of *Mansonia titillans*, Walker (after Goeldi). p. 494.
225. Wing of *Mansonia* (?) *nigra*. ♀. Theobald. p. 498.
226. Wing of *Mansonioides 7-guttata*. ♀. n. sp. p. 500.
227. Another wing of *Mansonioides 7-guttata*. ♀. n. sp. p. 500.
228. Cephalic and scutellar ornamentation of *Lepidoplatys squamiger*. ♀. Coquillett. p. 502.
229. Wing of *Lepidoplatys squamiger*. ♀. Coquillett. p. 503.
230. *Lepidoplatys squamiger*, Coquillett. Larval characters. (After Smith.) p. 504.
231. Denuded wing of *Melanoconion ornatus*. ♀. Theobald. p. 508.
232. *Culex melanurus*, Coquillett. Larval characters. p. 512.
233. Wing of female *Melanoconion annulipes*. ♀. n. sp. p. 513.
234. Wing of *Neomelanoconion rima*. ♀. Theobald. p. 514.
235. Male genitalia of *Neomelanoconion rima*, Theobald. p. 515.
236. Head and haltere of *Oculeomyia sarawaki*. ♀. n. sp. p. 516.
237. Wing of *Oculeomyia sarawaki*. ♀. n. sp. p. 517.
238. Wing of *Finlaya poicilia*. ♀. Theobald. p. 520.
239. Wing of *Bancroftia albicosta*. ♀. Lutz. p. 522.
240. *Pneumaculex signifer*, Coquillett. Larval characters. (After Smith.) p. 525.
241. Wing of *Heptaphlebomyia simplex*. ♀. Theobald. p. 532.
242. Wing of *Heptaphlebomyia simplex*. ♂. Theobald. p. 533.
243. Labial plate of *Aedes fuscus*, Osten-Sacken (after Felt). p. 538.
244. *Aedes fuscus*, Osten-Sacken. Larval characters. (After Smith.) p. 539.
245. Air tube of *Aedes fuscus* (after Felt). p. 539.
246. Wing of *Aedes nigrescens*. ♀. n. sp. p. 540.
247. Male genitalia of *Aedes nigrescens*. n. sp. p. 541.
248. Wing of *Skusea funerea*, var. *ornata*. ♀. Theobald. p. 543.
249. Wing of *Skusea mediofasciata*. ♀. n. sp. p. 545.
250. Male genitalia of *Skusea mediofasciata*. n. sp. p. 545.
251. Wing of *Skusea culiciformis*. ♀. Theobald. p. 547.

FIG.
252. *Leptosomatomyia lateralis.* ♂. Theobald. Head, scutellum and ♂ ungues. p. 549.
253. Wing of *Gualteria oswaldi.* ♀. Lutz. p. 553.
254. Siphon of *Uranotaenia sapphirina*, Osten-Sacken (after Felt). p. 557.
255. Labial plate of *Uranotaenia sapphirina* (after Felt). p. 557.
256. Pecten teeth of *U. sapphirina* (after Felt). p. 558.
257. Terminal segment of larva of *U. sapphirina* (after Felt). p. 558.
258. Wing of *Uranotaenia testacea.* ♀. Theobald. p. 560.
259. Wing of *Uranotaenia fusca.* ♀. n. sp. p. 564.
260. Male clasper of *Uranotaenia fusca*, Theobald. p. 565.
261. Male genitalia of *Uranotaenia geometrica*, Theobald. p. 566.
262. Wing of *Pseudouranotaenia rowlandii.* ♂. Theobald. p. 567.
263. Wing of *Pseudouranotaenia rowlandii.* ♀. Theobald. p. 568.
264. Mid ungues of ♂ *Pseudouranotaenia rowlandii*, Theobald. p. 569.
265. Wing of *Pseudouranotaenia rowlandii.* ♂. Theobald. p. 569.
266. Male genitalia of *Pseudouranotaenia rowlandii*, Theobald. p. 570.
267. Wing of *Anisocheleomyia alboannulata.* ♂. Theobald. p. 574.
268. Wing of *Hyloconops pallidoventer.* ♀. Lutz. p. 587.
269. Wing of *Hyloconops longipalpis.* ♀. Lutz. p. 589.
270. Wing of *Trichoprosopon compressum.* ♂. n. sp. p. 591.
271. Wing of *Trichoprosopon compressum.* ♀. n. sp. p. 592.
272. Labial plate of *Trichoprosopon nivipes* (after Goeldi). p. 593.
273. Siphon of *Trichoprosopon nivipes*, Theobald (after Goeldi). p. 593.
274. Wing of *Sabethes albiprivatus.* ♀. Lutz. p. 595.
275. Wing of *Phoniomyia indica.* ♀. Theobald. p. 602.
276. Wing of *Dendromyia mitchellii.* ♀. Theobald. p. 606.
277. Another wing of *Dendromyia mitchellii.* ♀. Theobald. p. 607.
278. Wing of *Dendromyia smithii.* ♀. Coquillett. p. 608.
279. Wing of *Dendromyia smithii.* ♂. Coquillett. p. 609.
280. *Dendromyia smithii*, Coquillett. Larval characters. (After Smith.) p. 610.
281. Wing of *Dendromyia oblita.* ♀. Lutz. p. 612.
282. Male genitalia of *Dendromyia personata*, Lutz. p. 613.
283. Wing of *Dendromyia personata.* ♂. Lutz. p. 614.
284. *Dendromyia serrata*, Lutz. ♂ genitalia. p. 616.
285. Wing of *Sabethinus intermedius.* ♀. Lutz. p. 619.
286. Wing of *Sabethinus intermedius.* ♂. Lutz. p. 620.
287. Wing of *Sabethinus albiprivatus.* ♀. Lutz. p. 621.
288. Wing of *Sabethinus aurescens.* ♀. Lutz. p. 622.
289. Head, scutellum and palp of *Philodendromyia barkeri.* ♂. p. 624.
290. Wing of *Philodendromyia barkeri.* ♂. n. sp. p. 624.
291. *Polylepidomyia argenteiventris*, Theobald. Head, scutellum and bristles of lobe. p. 625.
292. Wing of *Polylepidomyia argenteiventris.* Theobald. p. 626.
293. Male genitalia of *Limatus durhamii*, Theobald. p. 628.
294. Siphon and anal segments of *Limatus durhamii*, Theobald (after Goeldi). p. 628.
295. Labial plate of *Limatus durhamii* (after Goeldi). p. 628.
296. Pupa of *Limatus durhamii*, Theobald (after Goeldi). p. 629.
297. Larva of *Limatus durhamii*, Theobald (after Goeldi). p. 629.

LIST OF PLATES.

PLATE I.—WING SCALES.

(i) *Feltinella pallidopalpi.* ♀. n. sp.
(ii) *Myzorhynchella nigra.* ♀. n. sp.
(iii) *Quasistegomyia unilineata.* ♀. Theob.
(iv) *Howardina aurites.* ♀. n. sp.
(v) *Howardina chrysolineata.* ♀. n. sp.
(vi) *Pneumaculex signifer.* ♀. Coq.

PLATE II.—WING SCALES.

(i) *Carrollia irridescens.* ♀. Lutz.
(ii) *Pecomyia caeca.* ♀. Theob.
(iii) and (iv) *Pecomyia maculosa.* ♀. n. sp. Two areas of wing field.
(v) *Protomacleaya triseriata.* ♀. Say.
(vi) *Gnophodecmyia inornata.* ♀. Theob.

PLATE III.—WING SCALES.

(i) *Culiciomyia freetownensis.* ♀. Theob.
(ii) *Culiciomyia annulata.* ♀. n. sp.
(iii) *Culicada abserrata.* ♀. Felt.
(iv) *Culicada aurifer.* ♀. Coq.
(v) *Culicada abfitchii.* ♀. Felt.
(vi) *Culicada fluviatilis.* ♀. Lutz.

PLATE IV.—WING SCALES.

(i) *Culicada fitchii.* ♀. Felt.
(ii) *Grabhamia pulcritarsis.* ♀. Rond.
(iii) *Grabhamia subtilis.* ♀. Sergent.
(iv) *Lepidoplatys squamiger.* ♀. Coq.
(v) *Taeniorhynchus walsinghamii.* ♀. n. sp.
(vi) *Taeniorhynchus tenax.* ♀. Theob.

PLATE V.—WING SCALES.

(i) *Trichopronomyia microannulata.* ♀. n. sp.
(ii) *Bancroftia albicosta.* ♀. Lutz.
(iii) *Culiseta absobrina.* ♀. Felt.
(iv) *Melanoconion melanurus.* ♀. Coq.
(v) *Melanoconion annulipes.* ♀. Theob.
(vi) *Culex vishnui.* ♀. Theob.

PLATE VI.—WING SCALES.

(i) *Oculeomyia sarawakii.* ♀. n. sp.
(ii) *Pseudoheptaphlebomyia montforti.* ♀. Vent.
(iii) *Pseudouranotaenia rowlandi.* ♀. Theob.
(iv) *Aedes nigrescens.* ♀. n. sp.
(v) *Ficalbia nigripes.* ♀. n. sp.
(vi) *Gualteria oswaldi.* ♀. Lutz.

PLATE VII.—WING SCALES.

(i) *Philodendromyia barkeri.* ♀. n. sp.
(ii) *Dendromyia smithii.* ♀. Coq.
(iii) *Dendromyia oblita.* ♀. Lutz.
(iv) *Dendromyia personata.* ♂. Lutz (further enlarged).
(v) *Anisochelcomyia alboannulata.* ♀. Theob.
(vi) *Skusea mediofasciata.* ♀. Theob.

PLATE VIII.—WING SCALES.

(i) *Pleoniomyia quasilongirostris.* ♀. n. sp.
(ii) *Runchomyia frontosa.* ♂. Theob.
(iii) *Sabethinus intermedius.* ♂. Lutz.
(iv) *Sabethinus intermedius.* ♀. Lutz.
(v) *Sabethinus albiprivatus.* ♀. Lutz.
(vi) *Sabethoides purpureus.* ♀. n. sp.

PLATE IX.—MALE GENITALIA.

(i) *Leucomyia gelida.* Theob.
(ii) *Skusea mediofasciata.* Theob.
(iii) *Dendromyia personata.* Lutz.

PLATE X.—MALE GENITALIA.

(i) *Anopheles bifurcatus.* Linn.
(ii) *Dendromyia serrata.* Lutz.
(iii) *Acartomyia zammittii.* Theob.
(iv) *Grabhamia mariae.* Serg.
(v) *Pecomyia maculosa.* n. sp.

PLATE XI.—MALE GENITALIA.

(i) *Culex cylindricus.* Theob.
(ii) *Trichoprosopon compressum.* Lutz.
(iii) *Acartomyia zammittii.* Theob.
(iv) *Culex hirsutipalpis.* Theob.

PLATE XII.—MALE GENITALIA.

(i). Of *Culex cylindricus.* Theob. (abnormal).
(ii). Of *Culicada morsitans.* Theob.

PLATE XIII.—LARVAL SIPHONS.

(i) *Culex crinifer.* Lutz.
(ii) *Carrollia irridescens.* Lutz.
(iii) *Megarhinus solstitialis.* Lutz.

PLATE XIV.—HEADS OF LARVAE.

(i) *Desvoidya ventralis.* Walker.
(ii) *Culex crinifer.* Theob.
(iii) *Wyeomyia (?) leucostigma.* Lutz.

PLATE XV.—LARVAL CHARACTERS.

(i) Comb scales of *Culex impiger.* Walker.
(ii) Labial plate of *Culicada fitchii.* Felt.
(iii) Labial plate of *Culex pipiens.* Linnaeus.
(iv) Siphon of *Culex impiger.* Walker.
(v) Labial plate of *Culex impiger.* Walker (after Felt).

PLATE XVI.—LARVAL CHARACTERS.

(i) Of *Culex fatigans.* Wiedemann.
(ii) Of *Deinocerites cancer.* Theobald.

A MONOGRAPH

OF THE

CULICIDAE OF THE WORLD.

GENERAL NOTES.

Some general notes are given here which cannot be incorporated in the body of this work.

LEMNA MINOR AND OTHER DUCKWEEDS AS A PREVENTIVE AGAINST MOSQUITOES.

Major Adie, I.M.S. ("Ind. Med. Gaz.," xxxix., June, No. 6, 1904) brings considerable evidence to bear on the benefit of *Lemna minor* as a means of keeping mosquitoes from laying their eggs on water. He shows that tanks covered with this green flat weed never contain larvae of *Culicidae*, whilst others at the same time of year are full of them.

As a test he "cleared certain areas near the banks of all *Lemna* and enclosed them with light floating structures, which were fixed enough to resist the winds—in fact made experimental pools. I was pleased," he says, "to find in due time plenty of *Anopheles* larvae in these pools. This seemed to prove that *Lemna* acts as a mechanical obstruction to the process of egg-laying, and a very obvious method of prevention occurred to me. Why not deliberately promote the growth of *Lemna minor* in all unavoidable collections of water to prevent the propagation of mosquitoes?"

This same green plant grows freely in England, and I have noticed a similar occurrence here. A pond close to my house

was frequented by numbers of the larvae of *Anopheles bifurcatus* and *A. maculipennis* every year. Two years ago its surface became smothered with *Lemna minor*, Linn., and *Lemna arrhiza*, Linn., no *Anopheline* larvae could then be found. As this was the only breeding ground near, both species have practically died out.

This small yet widely distributed genus of floating plants evidently has a very marked effect upon the frequence of *Culicid* larvae in natural and artificial collections of water.

The little *Lemna arrhiza*, or the Rootless Duckweed, occurs in Asia, Africa, South America and Europe, and apparently has the same effect as the larger *L. minor*.

THE "LOBSTER-CLAW" PLANT (HELICONIA BRASILIENSIS) AS A BREEDING PLACE OF MOSQUITOES.

Mr. E. E. Green states that the flowers of this plant "are constructed so as to contain a considerable quantity of water, probably derived from rain. I have recently collected about half a pint of this liquid and find it to be swarming with the larvae of two species of mosquito—*Stegomyia scutellaris* and *Desvoidea obturbans*. This habit renders this plant an unfortunate neighbour. If it must be grown, it should be relegated to the more distant parts of the shrubbery and not cultivated in close proximity to the bungalow" ("Tropi. Agriculturist," N.S. xxv. 2, p. 297, 1905).

BROMELIAS AND BAMBOOS AS BREEDING PLACES OF MOSQUITOES.

Dr. A. Lutz in a valuable paper (Waldmosquitos und Waldmalaria, Centralbl. f. Bakt, etc., I., Abt. Originale, Bd. XXXIII., No. 4, pp. 282 to 292, 1903) points out how various *Culicids* may breed in the water collections of Bromelias, and figures such as *Acchnea tinctoria*, Mez.; *Nidularium ampullaceum*, E. Morr; *Eriocaulon vaginatum*, Kcke.; and *Freycinetia arnotti*, Gaud, as examples, also a Pitcher Plant (*Nepenthes gracilis*). Breeding in such places he mentions *Myzomyia lutzii*, *Trichoprosopon nivipes*, and others.

Dr. Leicester, working in Malaya, finds that particular species not only live in their larval stage in the small collections of water that collect in cut bamboos, but that they enter the holes

formed in bamboos by boring insects where water collects, and live in these small dark cavities.

Again, the *Dendromyia smithii*, Coquillett, is found in North America to live in the water of Pitcher plants, the eggs being laid in the undeveloped leaves. The larvae may be frozen up in the waters collected in the "pitchers" and yet develop.

SPECIES OF MOSQUITOES THAT ARE PROVED OR PROBABLE DISEASE CARRIERS.

The diseases carried by *Culicidae* are now known to be malaria, yellow fever, filariasis, and dengue.

At present only particular species are known to carry these diseases, but that we are only on the threshold of this subject we may gather from the fact that *Myzomyia rossii* is said not to be an active distributor in India, while Mr. Ernest Green says he is almost sure it is accountable for some of the outbreaks in Ceylon.

At present the following *Anophelines* are known to be agents of infection: *Anopheles maculipennis*, Meigen; *Anopheles bifurcatus*, Linnaeus; *Myzomyia listoni*, Liston; *Myzomyia culicifacies*, Giles; *Myzomyia funesta*, Giles; *Myzomyia superpicta*, Grassi; *Myzorhynchus paludis*, Theobald; *Myzorhynchus barbirostris*, Van der Wulp; *Myzorhynchus pseudopictus*, Grassi; *Pyretophorus costalis*, Loew; *Nyssorhynchus lutzi*, Theobald; *Cellia argyrotarsis*, Robineau-Desvoidy; *Cellia albimanus*, Wiedemann; *Myzorhynchus sinensis*, Wiedemann; *Myzorhynchus coustani*, Laveran; *Nyssorhynchus theobaldi*, Giles.

It has been also proved that the malarial parasites can develop in *Myzomyia turkhudi*, Liston.

It can probably be carried by *Pyretophorus ardensis*, Theobald, and *Pyretophorus pitchfordi*, Power.

The species which are doubtful are *A. martini*, *A. pursati*, *A. vincenti* of Laveran. Whatever they are, malarial parasites develop within them.

Yellow fever is solely carried by *Stegomyia fasciata*, Fabricius.

Filariasis by *Culex fatigans*, Wiedemann; *Pyretophorus costalis*, Loew: *Myzomyia rossii*, Giles; *Myzorhynchus nigerrimus*, Giles; *Myzorhynchus minutus*, Theobald; *Mansonia uniformis*, Theobald; *M. pseudotitillans*, Theobald; and *Cellia albimanus*, Wiedemann.

The larval filariae can live for a time at any rate in the

following: *Anopheles annulipes*, *Culex nigrithorax*, *C. procax*, *C. vigilax*, *C. annulirostris*, *Mucidus alternans*, and *Scutomyia notoscripta*.

The parasite may also occur, but does not seem to reach maturity in *Stegomyia scutellaris* and *S. fasciata*, in *Culex microannulatus*, *Anopheles maculipennis* and *Myzomyia funesta*.

Dengue it seems may be transmitted by *Culex fatigans* (Graham, H., Mosquitoes and dengue, Med. Record, LXI., pp. 204–207, 1902).

HERMAPHRODITISM IN CULICIDAE.

Two cases of hermaphroditism have been observed in Mosquitoes, both are recorded by Professor E. P. Felt. The species he and Young named *Culex abserratus* was described from a single bred specimen, which was bi-sexual. The right side being male, with the cephalic appendages largely female, while those of the posterior extremity are largely male. The male antenna is plumose, the female has elongate segments sparsely clothed with long hairs. The male palp well developed with conspicuous hair-tuft. The female palp was also normal. The sexual appendages were fully formed on the male side, but on the other poorly developed and distorted. Ungues on the front tarsi on the male side unequal, all the others and those of the female side equal.

It was bred from a larva (*vide* Mosquitoes or Culicidae of New York State, Bull. 79, Ent. 22, Div. Ent. N.Y. State Museum, 1904).

The other known form is the *Culicada pullatus*, Coquillett, in which the right antenna is male, the left, female with male tendencies shown in the enormous prolongation of the basal whorls of each segment. Both palpi are male. The right wing has also male characters, the left female.

The fore and mid legs of the right side, and the fore leg of the left side are male. The posterior abdominal segments are clearly female.

I believe these are the only cases of hermaphroditism known in this family.

LARVAL CHARACTERS.

A great deal has been done in America on *Culicid* larvae since the issue of the last volume. A large number of forms are now definitely known. The chief work has been done by Professor Felt, Professor C. B. Smith and Dr. Dyar. Dr. Grabham has also worked out a number of Jamaican forms; Professor Goeldi, some in South America, and a few are described from other regions in this volume.

Dr. Dyar and Mr. F. Knab in the paper referred to on p. 13 have described a number of forms, but as in most cases the adults are not known at present, the descriptions lose their value. It

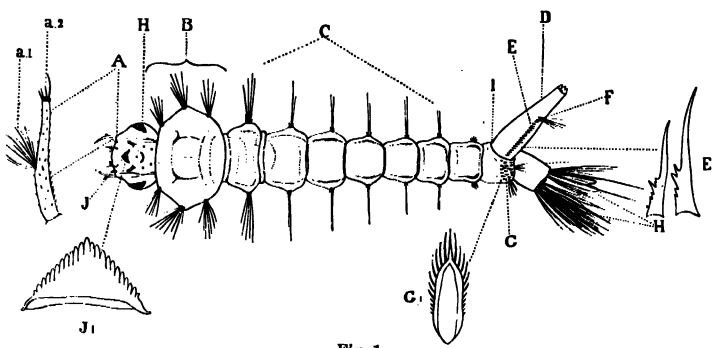


Fig. 1.

Diagram of larva.

A, Antenna; a_1, lateral tuft; a_2, apical spines; B, thorax; C, abdominal segments; D, siphon: E, pecten of siphon; E_1, pecten scales; H, anal gills; G, comb of 8th segment; G_1, comb scale; H, eyes; I, 8th segment; J and J_1, labial plate; F, siphon tuft.

is hoped by degrees they may be traced to the adults so that the correct names may be known.

The characters used for identifying the larvae of *Anophelinae* made most use of, are (i) the frontal hairs of the head; (ii) the structure of the antennae; and (iii) the structure of the palmate hairs. These have been referred to in the previous volumes, and need not be further considered here.

In the *Culicinae* the chief characters of diagnostic value are, (i) the form of the clypeus (Fig. J1); (ii) the structure of the antennae (A and a1); (iii) the form of the siphon (D); and (iv) the number and structure of the spines forming the pecten on the siphon (E) and on the so-called comb at its base (G and G1).

The general shape of the head and the cephalic setae and hairs on the body are also of use in identifying species. The most prominent structure is the siphon, the characters being the general form and size, presence or absence of setae, including the peculiar pecten at the base of the air tube.

The comb consists of a patch of spines, and forms a lateral organ on the eighth segment, just below the air tube.

The spines form a more or less triangular area, and vary from 5 to 100; it must be noticed that the number varies in each species to some extent. In *Anophelinae* the comb is very different from the *Culicinae*, and is much more specialised.

The following from Professor Felt's "Key for the Identification of Mosquito Larvae," will serve to show the usefulness of these characters in identifying the various species.*

a. Air-tube long, at least 4 times as long as the diameter of its base.
 b. Air-tube very long, slender, slightly constricted in the middle; antennae white banded *Culex territans.*
bb. Air-tube very long, stout, tapering uniformly.
 c. Comb scales 60, pecten teeth 3 to 4 branched *Culex salinarius.*
 cc. Comb scales 80, pecten apparently simple *Culicella dyari.*
 ccc. Comb scales narrow, spine-like, about 20 in a row, resembling grating *Culicella melanurus.*
bbb. Air-tube about 5 times the width of its base.
 c. Pecten pale, divided into 3 to 5 long, slender processes.
 d. Antennal tuft before the middle *Culex restuans.*
 dd. Antennal tuft at outer third.
 e. Antennae not white banded; air-tube somewhat fusiform; terminal spines of comb scales fine *Culex pipiens.*
 ee. Antennae usually conspicuously white banded; air-tube tapering.
 f. Air-tube not over four times as long as wide, terminal spines of comb scales coarse..... *Culex tarsalis.*
 ff. Air-tube over 4 times as long as wide, terminal spines of comb scales fine *Culex secutor.*
 cc. Pecten teeth pale, divided into two nearly equal processes *Deinocerites cancer.*

* Bull, 97, Ent. 24. Div. Ent., New York State Museum, p. 445 (1905).

ccc. Pecten teeth almost black, about 20 in number, with small basal dentitions, comb scales about 25.
d. Pecten rows continuous, the large apical spine of the comb scales being from ⅓ to ½ length of the entire structure... *Culicada fitchii.*
dd. Pecten with several isolated apical teeth.
e. Lateral hairs of first abdominal segment double, detached teeth of pecten well spaced *Culicada abfitchii.*
ee. Lateral hairs of first abdominal segment single, apical pecten teeth only a little detached..... *Culicada vittata.*
aa. Air-tube moderate in length, from about 2 to 4 times longer than its greatest diameter.
b. Air-tube decidedly fusiform.
c. Antennae long, anal segment long; comb consisting of 6 or 7 sub-equal spines... *Janthinosoma musica.*
cc. Antennae moderate, apical portion black; anal segment short, wider than long, with 4 pecten teeth on basal half of the air-tube *Grabhamia jamaicensis.*
aaa. Air-tube very short, not more than 1½ to 2 times as long as broad.
aaaa. No air-tube, or a very short one.
d. Comb teeth of equal length *Anopheles barberi.*
dd. Comb teeth of two sizes, long and short.
e. Comb teeth with large branches between them *Cellia albipes.*
ee. Comb teeth with only fine obscure pectinations.
f. Secondary teeth of the comb less than half as long as the primary ones... *Anopheles crucians* & *A. maculipennis.*
ff. Secondary teeth of comb over half as long as primary ones *Anopheles punctipennis, A. franciscanus.*

THE MALE GENITALIA.

The prominence now given to the male genitalia makes it necessary to add a figure showing the different parts that are important to notice.

Roughly the external male genitals consist of two "claspers," each of which has a large basal lobe (Fig. 2, *bes.*) and a variously shaped terminal clasp segment (*tes.*) which folds over like the blade of a knife. At the apex of this is found a more or

less developed spine,* which is thought by Professor Felt to be the rudiment of a ventral second segment analogous to the claspette (*c*) of the basal segment. The term claspette designates certain peculiar organs occurring on the ventral surface of the basal lobe, it may be represented by one or more spined tubercles or by a conspicuous basal spined lobe and a longer acute one near the apex of the basal segment.

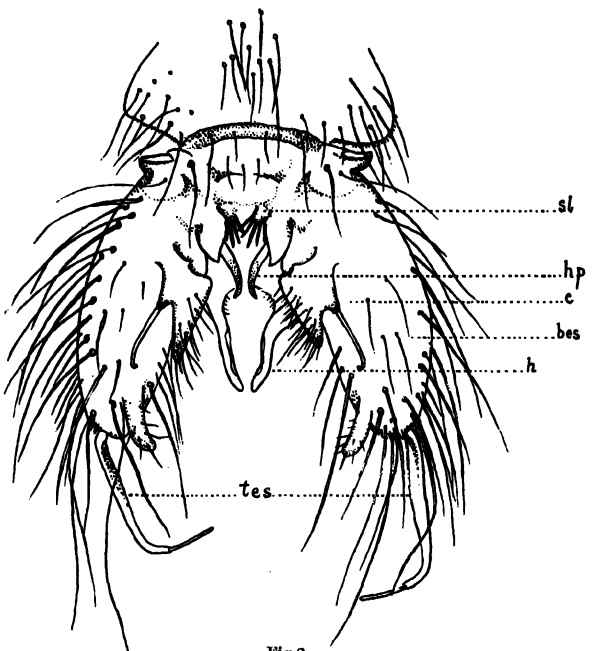


Fig 2.

Diagram of ♂ genitalia.

tes, Claspers ; h, harpes ; hp, harpagones ; c, claspette ; bes, basal lobe ; sl, setiferous lobes (after Felt).

The terminal segment varies very much in different forms, some being most striking appendages (*Dendromyia*, *Taeniorhynchus*, etc.). Between the clasps lie the *harpes* (*h*), normally forming the next largest structures, they arise from or near the base of the claspers, they are placed ventrally and sub-median. They are very diverse in form and in some groups are of two segments each. They are either very small or absent in *Aedeomyinae*.

* This may be absent in some species, double in others.

The *harpagones* (*hp*) are a pair of small clasping organs lying above the harpes and within the base of the clasps. They are frequently strongly curved and terminated by a stout recurved hook.

The *unci* consist of a pair of processes on the ventral margin and may be easily seen in *Culicinae*, but seem to be absent in *Anophelinae*. In certain groups (as *Chrysoconops*) they are stout and provided with a peculiar series of chitinous teeth. The *setaceous lobes* (*sl*) are part of the rudimentary eighth segment. They are in the form of chitinous lobes with a series of stout, chitinous spines.

NEW METHODS OF CLASSIFICATION.

Two new methods of classification have recently been proposed, the characters taken being (i) the male genitalia and wing veins and (ii) the larvae.

The former has been brought to notice especially by Felt,* the latter by Dyar and Knab,† and at the same time Dyar has formulated a grouping of genera by the genitalia. As characters the genitalia are undoubtedly of specific value, and according to Felt and from what is shown in this work they present marked generic characters, but to found genera on this one male character alone is scarcely wise.

The majority of known mosquitoes are females only, and thus we should not be able to place many of our well-known species in any genus and might have to wait years before males could be obtained. The classification given by Felt is as below (only his new genera being referred to), and it will be noticed he gives in addition to the male genitalia the characters presented by certain parts of the venation, namely, the relative lengths of the petiole of the fork-cells and the cross-veins. These are unfortunately variable; in some species the variation is great, in others slight, but it is such that generic characters cannot be fixed by them, nor even specific characters in some cases.

"CULICELSA. n. gen.—Petiole of anterior fork-cell of female wing about one-half its length. Posterior cross-vein more than

* Bull, 79, Ent. 22. New York State Museum (1904). Felt.

† Journ., New York. Ent. Soc., xiv., 4 (1906). Dyar and Knab.

its own length from mid-cross vein. Linear scales well separated from the sub-triangular, appressed vein scales. Petiole of fork-cell in male about two-thirds its length. Terminal clasp segment of male genitalia swollen at base. Harpes with a peculiar retrose spine. Larva with short air tube, comb composed of numerous, spatulate, spined scales. Type *taeniorhynchus*, Wiedemann; species *aurifer*, Coq.

"CULICADA. n. gen.—Petiole of first fork-cell of female wing nearly equal in length to that of the cell. Posterior cross-vein about its own length from mid cross-vein. Long scales distinct or shading with the closely appressed, usually thick vein scales. Petiole of first fork-cell in male equal in length to that of the cell, posterior cross-vein about its own length from mid cross-vein. Terminal clasp segment of male genitalia well developed with long apical spine. Claspette usually represented by well defined, apical and basal lobes. Harpes well developed, usually long and varying in shape. Larva with good sized tube and variable comb scales. Type *canadensis*, Theo.; species, *cantans*, Meig.; *sollicitans*, Walk., etc.

"ECCULEX. n. gen.—Petiole of anterior fork-cell of female wing about one-half of its length. Posterior cross-vein more than its length from mid cross-vein. Lateral scales long, well separated from the closely appressed, broad vein scales. Terminal clasp segment of male genitalia with sub-apical spine. Claspette a rather conspicuous basal lobe. Harpes broad, with recurved, terminal spine; harpagones terminated by three long, recurved spines. Larva with well developed air tube, comb scales with spatulate base and stout, terminal spine. Type *sylvestris*, Theo.; species *melanurus*, Coq.

"CULICELLA. n. gen.—Petiole of anterior fork-cell of female wing about two-thirds its length. Posterior cross-vein about its own length from mid cross-vein. Lateral vein scales well defined. Petiole of anterior fork-cell in male equal or longer than its cell, posterior cross-vein less than its own length from mid cross-vein. Terminal clasp segment of male genitalia slender, slightly curved, with small apical spine. Claspette a large basal lobe with prominent chitinous spine. Larva with very long air tube and with a large comb consisting of linear ciliated scales. Type, *dyari*, Coq.

"CULISETA. n. gen.—Petiole of anterior fork-cell of female wing about one-half its length. Posterior cross-vein less than its own length from mid cross-vein. Scales very large, lateral ones slender, linear; vein scales closely appressed, frequently elongated. Male wing with petiole of first fork-cell one-half to two-thirds the length of the cell, and the posterior cross-vein about its own length from mid cross-vein. Basal clasp segment of male genitalia triangular, apical segment slender, nearly straight. Claspette represented by a conspicuous basal lobe with one or more large chitinous spines. Harpagones recurved, with several apical teeth. Larvae with pecten prolonged into setae, and with stout, spined comb scales. Type, *absobrinus*, Felt; species, *magnipennis*, Felt,* and probably *incidens*, Thom.†

"PROTOCULEX. n. gen.—Petiole of anterior fork-cell of female wing about one-half the length of the cell. Posterior cross-vein more than its own length from mid cross-vein. The long lateral scales well separated from the appressed vein scales. Petiole of anterior fork-cell of male about equal in length to that of the cell. Terminal clasp segment of male genitalia slender, curved with stout apical spine. Claspette represented by a conspicuous basal spine-bearing lobe and a longer terminal one. Harpes broadly dilated at base, slender apically; harpagones with recurved apical spine. Larva with medium air tube, comb consisting of a few spine-like scales. Type, *serratus*, Theo."

Dr. Harrison G. Dyar's grouping and formation of Genera by ♂ genitalia (Proc. Ent. Soc. Wash. vii. No. 1. 1905) is given below:—

1. Harpes and harpagones absent or greatly reduced; clasp segment strong and longer than the basal segment	*Anopheles*
Harpes or harpagones developed; clasp segment usually shorter than the basal segment	2
2. Terminal clasp without a terminal articulated spine, though often otherwise modified, branched or spinous	3
Terminal clasp with an articulated spine which is usually apical: clasp usually simple, seldom modified	6

* This is a synonym of *consobrinus*, Desvoidy.

† This is a typical *Theobaldia*.

3.	Clasp transparent, membranous	4
	Clasp chitinous, solid	5
4.	Clasp inflated, lobed, irregular, apparently erectile	*Wyeomyia*
	Clasp broad, simple, with minute apical spine	*Uranotaenia*
5.	Clasp enlarged, clawed, hirsute on outer aspect	*Deinocerites*
	Clasp slender, bifurcate, arising sub-apically	*Aedes*
6.	Harpes filamentous, or papillose, slender, delicate	7
	Harpes non-filamentous, chitinous or spined	11
7.	Harpes filamentous; unci reduced or invisible	8
	Harpes papillose-capitate; unci an undivided basal cone	*Janthinosoma*
8.	Harpes broadened at the base, not jointed; outer lobe of side-piece finger-shaped	*Protoculex*
	Harpes not broad at base, jointed centrally	9
9.	Side-piece with a heavy terminal brush; harpes hooked	*Pseudoculex.* n. g.
	Side-pieces without terminal brush	10
10.	Harpes hooked by a slender retrose spine	*Culiselsa*
	Harpes not hooked	**Grabhamia*
11.	Clasp with an outward angle and spines; harpes touching to form a ring-shaped structure	*Psorophora*
	Without these characters; clasp simple	12
12.	Terminal clasp expanded, narrow, bladder-like	13
13.	Basal lobe of side-piece setose	**Feltidia.* n. g.
	Basal lobe of side-piece a thick chitinous rod	*Coquillettidia.* n. g.
14.	Side-piece with a sub-apical process within bearing setae and filamentous or leaf-like appendages	20
	Side-piece without such a process	15
15.	Clasp with the articulated tip sub-terminal	*Ecculex*
	Clasp with the articulated tip terminal	16
16.	Side-pieces short, conical; harpes with long branch at base	*Stegomyia*
	Side-pieces long, conical; harpes not so branched	17
17.	Harpes with trifid apex; tip of clasp multiple divided	*Pneumaculex.* n. g.
	Harpes with simple or spinose apex	18
18.	Appendicular tip of clasp long	*Megarhinus*
	Appendicular tip of clasp minute	19
19.	Unci not forming a central projecting sac	*Theobaldinella*
	Unci united into a large central projecting sac	*Culicella*
20.	Harpes nearly simple, dentate only	21
	Harpes heavily spined, often recurved	*Culex*
21.	Leaf-like scale of apical lobe of side-piece absent	*Neoculex.* n. g.
	Leaf-like scale present, setae arising from a second basal lobe	*Melanoconion*

* This, of course, is an error. The type of the genus *Grabhamia* I made *jamaicensis*—not *dorsalis*, Meigen. *Feltidia* was founded for *jamaicensis*—*i.e.*, it is the genus *Grabhamia.*

Five new genera are here formed by Dr. Dyar; of these one *Feltidia* is certainly invalid, and must sink as a synonym of *Grabhamia*, and it is very doubtful if the others should be accepted, founded as they are on a single sexual character only. I have retained the names, however, but give full generic details in each case.

Dr. Dyar remarks that "genitalic divisions are more natural than those recently founded on scales and palpi." This, of course, is a matter of opinion, but one would think that characters which are common to both sexes, such as the scales, would form more natural divisions than any single male structure. Such we find to be the case, not only from a structural, but also from the bionomic point of view.

How can one place a female in any of the genera founded on ♂ sexual structure only? It is quite an unpractical method of classification. Dr. Dyar tells us, that by genitalic and larval characters *Janthinosoma musica* and *Culex* (*Grabhamia*) *jamaicensis* should be together. More totally diverse forms could not be seen.

Messrs. Dyar and Knab have issued a long careful paper dealing with the classification of *Culicidae* by larval characters, entitled, "The Larvae of Culicidae classified as Independent Organisms" (Journ. N. York Ent. Soc., vol. xiv., no. 4, pp. 169–230, 1906). In this paper they combat the value of scale structure as characters of generic value.

That larval characters are of great value and interest there is no doubt, but to form genera and species on larvae is surely unusual. In this scheme the authors divide the *Culicidae* into three sub-families as follows:—

Air-tube short and sessile; a series of sub-dorsal palmate hair tufts on the abdomen *Anophelinae.*

Air-tube elongate, at least longer than wide; no dorsal palmate hairs.

Anal segment with an unpaired ventral brush or rudder of dense hair tufts *Culicinae.*

Anal segment without unpaired median ventral brush..... *Sabethinae.*

All other genera of *Anophelinae* are sunk as synonyms of *Anopheles*, but the authors raise one species—*barberi* of Coquillett, a species so close to *bifurcatus* that it is hardly separable—to generic rank calling it *Coelodiazesis.*

The differences being as below :—

Abdomen with plumose lateral hairs only on the first 3 segments; head with plumose hairs *Anopheles.*
Abdomen with plumose lateral hairs to the 6th segment; head with small simple hairs only..... *Coelodiazesis.*

In the genus *Janthinosoma*, of Arribalzaga, they place my *scholasticus* (a *Culex*, so near *fatigans*, I am not sure if it is distinct), and my *Grabhamia pygmaea* and *G. jamaicensis*, insects of totally different appearance and habits to the type of *Janthinosoma*.

They find that larval characters place *Pneumaculex signifer*, Coquillett, in the genus *Mansonia*. Still more surprising is the fact that from these larval characters, *Haemagogus*, *Stegomyia*, *Grabhamia*, *Howardina*, *Culicelsa*, *Culicada*, etc., and even Dyar's own genus *Pseudoculex* sink under AEDES.

The plates by Mr. F. Knab of the anal segments of the larvae will be of value for future work.

COQUILLETT'S CLASSIFICATION OF MOSQUITOES.

It is pleasing to turn to this classification issued by the U.S. Department of Agriculture (Tech. Se. 11, Bureau of Entomology, 1906). The characters taken in this are varied, and are those dealing with scales, venation and adult characters generally. Much the same sub-families as are adopted in this work are given, namely: *Anophelinae*, *Megarhininae*, *Psorophorinae*, *Culicinae*, *Deinoceratinae*, *Uranotaeniinae*, *Trichoprosoponinae*, but the *Aedeomyinae* and *Haemagoginae* are sunk under the *Culicinae*. This, in view of the genus *Mimomyia*, is wise; but, nevertheless, it is advantageous to retain the sub-family *Aedeomyinae*, and when our knowledge is more advanced we shall probably find it convenient for identification to form a group of those forms intermediate between true *Culicinae* and *Aedeomyinae*.

In this classification Mr. Coquillett, whilst advancing the subject generally, seems to have made a retrograde movement by sinking such genera of Felt's as *Culicada* and *Culicelsa* under Arribalzaga's *Ochlerotatus*. Under this name he includes species which are surely far apart, as *spenceri*, Theobald (a distinct *Grabhamia*), *impiger*, Walker (a true *Culex*), and *triseriatus*, Say, and many other diverse forms.

Previous to this Coquillett * laid great stress on the structure of the ungues, but as such closely related forms as *fatigans* and *dentatus* have them different, it is evidently of no great value.

SEPARATION OF CORETHRA, MOCHLONYX, ETC., FROM THE CULICIDAE.

Dr. Adolf Eysell in his paper, "Sind die Culiciden eine Familie?" (Archiv für Schiffs-und Tropen-Hygiene, Bd. IX., pp. 51–55, 1905), was the first to separate the *Corethrinae* from the family *Culicidae*, and raised them to the rank of a family, *Corethridae* (*Buschelmücken*) which, on account of the structure of the mouth, the absence of scale structure on wings, body, and legs, and the peculiarities of their larvae is certainly correct. At the same time he places the *Anophelines* in a separate family, the *Anophelidae*. Although there are such marked differences between the asiphonate larvae of the *Anophelinae* and the siphonate *Culicinae* we think that as in adult structure they so much agree, and as we find such intermediate larval forms as *Mansonia* and *Taeniorhynchus* they are best retained in this family, whilst the *Corethridae* are completely separated on account of not only their larvae, but mainly the absence of the long piercing mouth and the absence of scales in the adults.

LUTZ'S GENERAL CLASSIFICATION.

Dr. A. Lutz has adopted a new grouping of families and genera, which seems to be based on excellent grounds.

The table given here is taken from Lutz's work in "Mosquitos do Brasil" (Bourroul).

There is one alteration I would propose—that is, excluding the *Culicimorphae* entirely and raising them to family rank. If this is done the term *Corethridae* should supersede *Culicimorphae*. The classification by means of the relative lengths of palpi is, however, not satisfactory, as we get so many intermediate forms, such as *Mimomyia*, which is Aedine in general appearance, yet the male has palpi more than half the length of the proboscis. This genus then must surely come amongst Lutz's *Heteropalpae* and not the *Micropalpae*.

* Canad. Ento., p. 43 (1876), and Science XXIII., p. 313 (1906).

CULICIDAE.

EUCULICIDAE. (Proboscis piercing.)

ASIPHONATAE. (Larvae without respiratory siphon.)

Sub-fam. *Anophelinae.*
Palpi in both sexes long.
- Anopheles.
- Myzomyia.
- Cyclolepidopteron.
- Stethomyia.
- Pyretophorus.
- Arribalzagia.
- Myzorhynchus.
- Nyssorhynchus.
- Cellia.
- Aldrichia.

SIPHONATAE. (Larvae with respiratory siphon.)

ANKYLORHYNCHAE. (Proboscis curved.)

Sub-fam. *Megarhininae.*
- Megarhinus.
- Ankylorhynchus.
- Toxorhynchites.

METANOTOPSILAE. (Metanotum nude.)

HETEROPALPAE. (Palpi of ♂ long; ♀ short.)

Sub-fam. *Culicinae.*
- Culex.
- Theobaldia.
- Pseudotheobaldia.
- Lutzia.
- Lasioconops.
- Lophoceraomyia.
- Trichopronomyia.
- Gilesia.
- Melanoconion.
- Grabhamia.
- Pseudograbhamia.
- Acartomyia.
- Taeniorhynchus.
- Mansonia.
- Mansonioides.
- Psorophora.
- Mucidus.
- Janthinosoma.
- Bancroftia.
- Finlaya.
- Howardina
- Macleaya.
- Scutomyia.
- Pseudoskusea.
- Catageiomyia.
- Gualteria.
- Desvoidea.
- Stegomyia.

MICROPALPAE. (Palpi short in both sexes.)

Sub-fam. *Aedinae.*
- Aedes.
- Deinocerites.
- Aedinus.
- Aedeomyia.

Sub-fam. *Haemagoginae.*
- Haemagogus.
- Uranotaenia.
- Verrallina.
- Mimomyia.
- Pseudouranotaenia.
- Anisocheleomyia.
- Ficalbia.
- Skusea.

CULICIMORPHAE. (Non-piercing proboscis.)

- Mochlonyx.
- Corethra.
- Corethrella.
- Sayomyia, etc.

ORTHORHYNCHAE (Proboscis straight.)

METANOTRICHAE. (Metanotum with chaetae or scales.)

HETEROPALPAE.

Sub-fam. *Hyloconopinae.*
- Trichoprosopon.
- Joblotia.
- Hyloconops.
- Rhynchomyia.
- Goeldia.

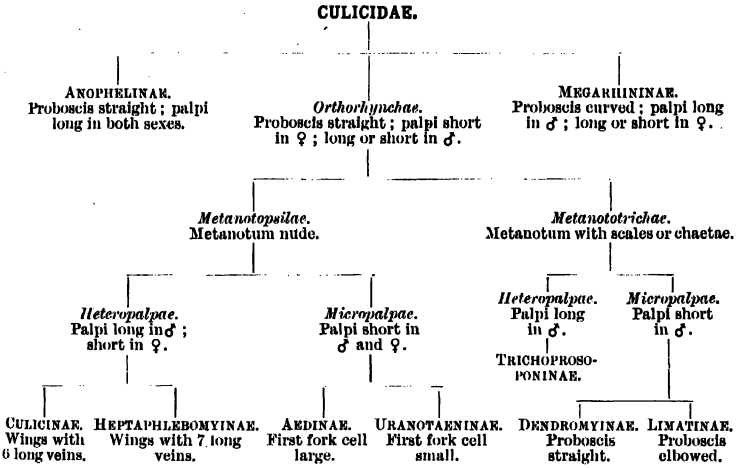
MICROPALPAE.

Sub-fam. *Dendromyinae.*
- Phoniomyia.
- Wyeomyia.
- Dendromyia.
- Sabethes.
- Sabethoides.
- Sabethinus.
- Limatus.

It is nevertheless by far the best general classification yet proposed, and it is followed in this volume. Whilst retaining the definitions of the original describers of the first *Culicid* genera, it at the same time brings the matter up to date in conformity with our recent knowledge.

The chief characters of the groups are given in the table below.

The best modification of this that can be made is as follows :—



Dr. Lutz's sub-family *Ankylorhynchae* is synonymous with my *Megarhininae* and his *Hyloconopinae* with my *Trichoprosoponinae*.

Two other sub-families may be added, namely, *Deinoceratinae* of Mitchell, and *Limatinae*, Theobald—the former having long antennae with long second segment, the latter having a quaint elbowed proboscis.

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TABLE OF SUB-FAMILIES.

A. Scutellum simple, never trilobed. Proboscis straight; palpi long in ♂ and ♀ ANOPHELINAE
AA. Scutellum trilobed.
a. Proboscis strongly recurved; first submarginal cell very small MEGARHININAE
aa. Proboscis straight; metanotum nude.
β. Wings with 6 long scaled veins.
γ. Antennae with second joint normal in length.
δ. First submarginal cell as long or longer than second posterior cell.
ε. Palpi of ♀ shorter than proboscis, of the ♂ long CULICINAE
εε. Palpi short in ♂ and ♀ AEDINAE
δδ. First submarginal cell very small, smaller than second posterior cell URANOTAENINAE
γγ. Second segment of antennae very long DEINOCERATINAE
ββ. Wings with 7 long scaled veins ... HEPTAPHLEBOMYINAE
aaa. Proboscis straight; metanotum with scales or chaetae.
ζ. Palpi long in ♂, short in ♀ TRICHOPROSOPONINAE
ζζ. Palpi short in ♂ and ♀ DENDROMYINAE
aaaa. Proboscis elbowed LIMATINAE

CHARACTERS OF SUB-FAMILIES.

Sub-family ANOPHELINAE. Theobald.

In this sub-family the scutellum is simple, never trilobed; the palpi are long in ♂ and ♀, and the larvae have no respiratory siphon. The head never has flat lateral scales.

The genera may easily be told by the squamose characters of head, thorax, abdomen and wings, etc.

Sub-family MEGARHININAE. Theobald.

Anchylorhynchae. Lutz.

Lynchinellinae. Lahille.

In this sub-family the proboscis is strongly re-curved; head and scutellum densely clothed with flat scales. The palpi of the ♀ may be short or long. The first sub-marginal cell is very small.

Sub-family CULICINAE. Theobald.

Proboscis straight; metanotum nude; palpi long in ♂, short in ♀. Antennae of ♂ plumose; second segment normal. First sub-marginal cell as long as or longer than the second posterior cell. Wings with six scaled longitudinal veins.

Sub-family AEDINAE. Theobald.

Proboscis straight; metanotum nude; palpi short in ♂ and ♀. Antennae of ♂ plumose, ♀ pilose. Wings with six longitudinal scaled veins. First sub-marginal cell as long or longer than the second posterior cell.

Sub-family URANOTAENINAE. Mitchell.

First sub-marginal cell very small, always smaller than the second posterior cell. Proboscis straight, swollen apically. Palpi short in ♂ and ♀. Antennae plumose in ♂, pilose in ♀. Second segment of antennae normal.

Sub-family DEINOCERATINAE. Mitchell.

Proboscis straight; metanotum nude. First sub-marginal cell longer than second posterior. Antennae pilose in ♂ and ♀. Palpi short in ♂ and ♀. Second segment of antennae very long. Wings with six longitudinal scaled veins.

Sub-family HEPTAPHLEBOMYINAE. Theobald.

Proboscis straight; metanotum nude. First sub-marginal cell long. Antennae pilose in ♀, plumose in ♂. Wings with seven longitudinal scaled veins. Palpi short in ♀, long in ♂.

Sub-family TRICHOPROSOPONINAE. Theobald.

Joblotinae. Blanchard.

Hyloconopinae. Lutz.

Proboscis straight. Metanotum with squamae or chaetae. Palpi long in ♂, short in ♀. First sub-marginal cell longer than the second posterior cell.

Sub-family DENDROMYINAE. Lutz.

Proboscis straight. Metanotum with chaetae or squamae. Palpi short in both sexes. First sub-marginal cell longer than the second posterior cell.

Sub-family LIMATINAE. n. sub-fam.

Proboscis elbowed. Metanotum squamose. Palpi short in ♂ and ♀. First sub-marginal cell longer than second posterior cell.

LIST OF GENERA.

Sub-family ANOPHELINAE. Theobald.

Genus (1) *Anopheles*, Meigen; (2) *Myzomyia*, Blanchard; (3) *Cycloleppteron*, Theobald; (4) *Feltinella*, n. g.; (5) *Stethomyia*, Theobald; (6) *Pyretophorus*, Blanchard; (7) *Myzorhynchella*, n. g.; (8) *Arribalzagia*, Theobald; (9) *Myzorhynchus*, Blanchard; (10) *Chrystia*, Theobald; (11) *Lophoscelomyia*, Theobald; (12) *Nyssorhynchus*, Blanchard; (13) *Cellia*, Theobald; (14) *Neocellia*, n. g.; (15) *Aldrichia*, Theobald; (16) *Kertészia*, Theobald; (17) *Bironella*, Theobald. (18) *Chagasia*, Cruz.

Sub-family MEGARHININAE. Theobald.

Ankylorhynchae. Lutz.

Lynchinellinae. Lahille.

Genus (1) *Megarhinus*, Rob. Desvoidy; (2) *Ankylorhynchus*, Lutz; (3) *Toxorhynchites*, Theobald.

Sub-family CULICINAE. Theobald.

Genus (1) *Janthinosoma*, Arribalzaga; (2) *Psorophora*, Robineau Desvoidy; (3) *Mucidus*, Theobald; (4) *Eretmapodites*, Theobald; (5) *Quasistego-*

myia, Theobald; (6) *Desvoidea*, Blanchard; (7) *Stegomyia*, Theobald; (8) *Pseudoskusea*, Theobald; (9) *Ludlowia*, n. g.; (10) *Scutomyia*, Theobald; (11) *Aedimorphus*, Theobald; (12) *Leicesteria*, Theobald; (13) *Macleaya*, Theobald; (14) *Carrollia*, Lutz; (15) *Popea*, Ludlow; (16) *Howardina*, Theobald; (17) *Hulecoeteomyia*, Theobald; (18) *Phagomyia*, Theobald; (19) *Polyleptiomyia*, Theobald; (20) *Neomacleaya*, n. g.; (21) *Pseudohowardina*, n. g.; (22) *Lepidotomyia*, Theobald; (23) *Protomacleaya*, n. g.; (24) *Reedomyia*, Ludlow; (25) *Pecomyia*, Theobald; (26) *Catageiomyia*, Theobald; (27) *Gilesia*, Theobald; (28) *Trichorhynchus*, Theobald; (29) *Pseudotheobaldia*, n. g.; (30) *Maillotia*, n. g.; (31) *Theobaldia*, Neveu-Lemaire; (32) *Pardomyia*, n. g.; (33) *Megaculex*, n. g.; (34) *Grabhamia*, Theobald; (35) *Pseudograbhamia*, Theobald; (36) *Acartomyia*, Theobald; (37) *Lutzia*, Theobald; (38) *Culicada*, Felt.; (39) *Culicelsa*, Felt.; (40) *Culiseta*, Felt.; (41) *Culex*, Linnaeus; (42) *Microculex*, n. g.; (43) *Protoculex*, Felt.; (44) *Lophoceraomyia*, Theobald; (45) *Aporoculex*, n. g.; (46) *Leucomyia*, n. g.; (47) *Trichopronomyia*, Theobald; (48) *Taeniorhynchus*, Arribalzaga; (49) *Chrysoconops*, Goeldi; (50) *Mansonia*, Blanchard; (51) *Mansonioides*, n. g.; (52) *Etorleptiomyia*, Theobald; (53) *Melanoconion*, Theobald; (54) *Neomelanoconion*, n. g.; (55) *Lasioconops*, Theobald; (56) *Finlaya*, Theobald; (57) *Oculeomyia*, n. g.; (58) *Rachionotomyia*, Theobald.*

Sub-family Aedinae. Theobald.

Genus (1) *Aedes*, Meigen; (2) *Finlaya*, Theobald; (3) *Orthopodomyia*, Theobald; (4) *Skusea*, Theobald; (5) *Leptosomatomyia*, Theobald; (6) *Haemagogus*, Williston; (7) *Cacomyia*, Coquillett; (8) *Gualteria*, Lutz; (9) *Aedeomyia*, Theobald.

Sub-family Uranotaeninae. Mitchell.

Genus (1) *Uranotaenia*, Arribalzaga; (2) *Pseudouranotaenia*, Theobald; (3) *Anisochelcomyia*, Theobald; (4) *Mimomyia*, Theobald.

Sub-family Heptaphlebomyinae. Theobald.

Genus (1) *Heptaphlebomyia*, Theobald; (2) *Pseudoheptaphlebomyia*, Ventrillon.

Sub-family Trichoprosoponinae. Theobald.

Joblotinae. Blanchard.

Hyloconopinae. Lutz.

Genus (1) *Runchomyia*, Theobald; (2) *Hyloconops*, Lutz; (3) *Trichoprosopon*, Theobald; (4) *Joblotia*, Blanchard—Lutz.

* The following have recently been added: *Lepidoplatys*, Coquillett; *Gymnometopa*, Coquillett.

Sub-family DENDROMYINAE. Lutz.
Sabettinae. Lutz.

Genus (1) *Wyeomyia*, Theobald; (2) *Phoniomyia*, Theobald; (3) *Dendromyia*, Theobald; (4) *Philodendromyia*, n. g.; (5) *Polylepidomyia*, Theobald; (6) *Sabethes*, Robineau Desvoidy; (7) *Sabethoides*, Theobald; (8) *Sabettinus*, Lutz.

Sub-family LIMATINAE. n. sub-fam.

Genus (1) *Limatus*, Theobald.

SUB-FAMILY **ANOPHELINAE.** Theobald.

Eight new genera have been added to this sub-family since the appearance of volume iii. The most marked is *Bironella*, which has a wing venation like *Megarhinus*.

TABLE OF GENERA.

A. First sub-marginal cell large.
 I. Antennal segments without dense lateral scale tufts.
 (a) Thorax and abdomen with hair-like curved scales.
 α. No flat scales on head, but upright forked ones.
 β. Basal lobe of ♂ genitalia of one segment.
 1. Wing scales large, lanceolate Genus ANOPHELES. Meigen.
 2. Wing scales mostly small, long and narrow or slightly lanceolate Genus MYZOMYIA. Blanchard.
 3. Wings with patches of large inflated scales Genus CYCLOLEPTERON. Theobald.
 ββ. Basal lobe of two segments.
 4. Prothoracic lobes with dense outstanding scales ...Genus FELTINELLA. n. g.
 αα. Median area of head with some flat scales; prothoracic lobes mammillated.
 5. Wing scales lanceolate Genus STETHOMYIA. Theobald.
 (b) Thorax with narrow-curved scales; abdomen hairy.
 6. Wing scales small and lanceolate; head with normal forked scales Genus PYRETOPHORUS. Blanchard.

7. Wing scales broad and lanceolate; head with broad scales, not closely appressed but not forked or fimbriated Genus MYZORHYNCHELLA. n. g.

(c) Thorax with hair-like curved scales and some narrow-curved ones in front; abdomen with apical lateral scale tufts and scaly venter; no ventral tuft.

8. Wing scales lanceolate Genus ARRIBALZAGIA. Theobald.

(d) Thorax with hair-like curved scales; no lateral abdominal tufts; distinct apical ventral tuft. Palpi densely scaly.

9. Wing with dense large lanceolate scales Genus MYZORHYNCHUS. Blanchard.

(e) Thorax with hair-like curved scales and some narrow-curved lateral ones; abdomen hairy with dense long hair-like lateral apical scaly tufts.

10. Wing scales short, dense, lanceolate; fork-cells short..... Genus CHRISTYA. Theobald.

(f) Thorax with very long hair-like curved scales; abdomen with hairs except last two segments which are scaly. Dense scale tufts to hind femora.

11. Wings with broadish, blunt lanceolate scales Genus LOPHOSCELOMYIA. Theobald.

(g) Thorax and abdomen with scales.

12. Thoracic scales narrow-curved or spindle shaped; abdominal scales as lateral tufts and small dorsal patches of flat scales Genus NYSSORHYNCHUS. Blanchard.

13. Abdomen nearly completely scaled with long irregular scales and with lateral scale tufts Genus CELLIA. Theobald.

14. Similar to above, but no lateral scale tufts Genus NEOCELLIA. n. g.

15. Abdomen completely scaled with large flat scales as in *Culex* Genus ALDRICHIA. Theobald.

16. Thoracic scales hair-like, except a few narrow-curved ones in front; abdominal scales long, broad and irregular Genus KERTÉSZIA. Theobald.

II. 17. Antennal segments with many dense scale tufts Genus CHAGASIA. Cruz.

B. 18. First sub-marginal cell very small Genus BIRÓNELLA. Theobald.

GENUS **ANOPHELES.** Meigen.

The following is a complete list of the known species of this genus :—

1. *A. maculipennis*, Meigen, Syst. Beschr. Eur. Zweifl. Ins. Dipt. Vol. I., p. 11, f. 2 (1818) (Europe and North America).
 claviger, Fabricius, No type existed. Syst. Antl., p. 35 (1805).
 quadrimaculatus, Say, Long's. Exped. St. Peters. River, Vol. II., app. 356.
2. *A. bifurcatus*, Linnaeus, Ins. Suec. p. 1891 (1758) (Europe, North America).
 trifurcatus, Fabricius, Ent. Syst. Vol. IV., p. 401 (3) (1792).
 claviger, Meigen, Syst. Beschr. Vol. I.-II.-I. and VI., p. 242 (1804).
 villosus, Robineau-Desvoidy, Essai Culic. (1827).
 walkeri, Theobald, Mono. Culicid. Vol. I., p. 199 (1901).
3. *A. algeriensis*, Theobald, Ann. Inst. Pasteur, Vol. XVII., p. 2 (1903); Mono. Culicid. Vol. III., p. 21 (1903) (Algeria).
4. *A. corethroides*, n. sp. (Queensland).
5. *A. smithii*, Theobald, Entomo. Vol. XXXIX., p. 101 (1905) (Sierra Leone).
6. *A. aitkenii*, James and Theobald, Mono. Culicid. Vol. III., p. 22 (1903) (Goa and Karwar).
7. *A. immaculatus*, Theobald, Mono. Culicid. Vol. III., p. 22 (1903) (India).
8. *A. nigripes*, Staeger, Syst. For. o. d. i. Denm. Nid. fundne Dipt. (1839) (Northern Europe and North America).
 ? *plumbeus*, Haliday, Zool. Journ. Vol. XII. (1828).
9. *A. lindesayii*, Giles, Hand-Book of Gnats, p. 166 (1900) (North India).
10. *A. punctipennis*, Say, Journ. Acad. Nat. Sc. Philad. Vol. III. (1823) (North America).
 Culex hyemalis, Fitch.
11. *A. pseudopunctipennis*, Theobald Mono. Culicid. Vol. II., p. 305 (1901) (Grenada and New Mexico).
12. *A. gigas*, Giles, Ent. Monthly Mag. Vol. XXXVII., p. 196 (Conoor, Nehilgerri Hills, India).
13. *A. crucians*, Wiedemann, Aussereurop. Zweifl. Ins. p. 12 (1828) (North America).
14. *A. wellcomei*, Theobald, Rep. Gordon College Lab. Sudan, p. 64 (1904) (Sudan, Aden Hinterland).
15. *A. barberi*, Coquillett, Canad. Ent. p. 310 (1903) (Maryland, U.S.A.). Probably a variety of *bifurcatus*.

16. *A. franciscanus*, McCracken, Ent. News. Vol. XV., p. 12 (1904) (California).

SPECIES UNCERTAIN.

A. ferrugineus, Wiedemann, Aussereurop. Zweifl. Ins. p. 12 (1828) (New Orleans).

SYNOPTIC TABLE OF ANOPHELES.

A. Wings spotted.
 I. Legs unbanded.
 α. Wings with spots formed of collections of scales on the wing field—
 no costal spots *maculipennis.* Meigen.
 β. Wings with light and dark costal markings.
 Costa with two yellow spots.
 Large species.
 No fringe spots *punctipennis.* Say.
 Fringe spots present..... *pseudopunctipennis.* Theobald.
 Small species.
 γ Wings much spotted *franciscanus.* McCracken.
 II. Legs with basal pale bands.
 Two large dark costal spots *gigas.* Giles.
 III. Legs with narrow apical bands.
 Costa dark with two small pale yellow spots..... *wellcomei.* Theobald.

B. Wings unspotted.
 I. Legs unbanded.
 α. Thorax adorned as in Corethra..... *corethroides.* n. sp.
 αα. Thorax normal ornamentation.
 β. Second fork-cell much more than half the length of the first.
 γ. Palpi unbanded.
 δ. Petiole of first fork-cell more than ¼ length of cell.
 Abdomen with golden hairs *bifurcatus.* Linnæ.
 Abdomen with brown hairs *algeriensis.* Theobald.
 δδ. Petiole of first fork-cell ¼ length of cell *barberi.* Coquillett.
 γγ. Palpi banded.
 Dark species.
 Wing scales very dense *smithii.* Theobald.
 Wing scales not so dense *nigripes.* Staeger.
 ββ. Second fork-cell not more than half the length of the first *aitkenii.* Theobald.
 II. Legs banded.
 Hind femora only with broad white band..... *lindsayii.* Giles.
 Apices of hind tarsi pale..... *immaculatus.* Theobald.
 Position uncertain *eiseni.* Coquillett.

ANOPHELES MACULIPENNIS. Meigen (1818).

Anopheles bifurcatus. Meigen (1804). (Non Linne, 1758).

Anopheles claviger. Fabricius (1805). (No type existed).

Anopheles quadrimaculatus. Say (1824).

Anopheles annulimanus. Van der Wulp (1867*).

(European Form.)

Syst. Beschr. Europ. Zwei. Ins. i., 11, 2 (1818), Meigen; Classif und Beschr. d. europ. zweif. Insek. (Dip. Lin.), xxviii., 1, p. 5, Meigen; Syst. Antl., p. 35, 6 (1805), Fabricius; Zool. Journ., I., p. 457 (1825), and III. Ibidem, p. 503 (1828); Syst. Cat. Brit. Ins. II., p. 233 (1829), Stephens; Mem. d. la Soc d'Hist. Nat. de Paris, III., p. 411 (1827), Robineau Desvoidy; Isis, p. 1203 (1831), Ruthe; Hist. Nat. Dipt. i., 32, 2 (1834), Macquart; Natur. Tidsskrift, II., p. 552 (1839), Staeger; Bull. Soc. Imp. Nat. Mosc. III., 294, 2 (1845), Gimmerthal; Brit. Ent., 210, 2, Curtis; Cat. Dipt. Ins. Brit. Mus. i., p. 9 (1848), Walker; Diptera Scand. ix., p. 3468 (1850), Zetterstedt; Fauna Austriaca, p. 625 (1864), Schiner; Dipt. Neer., p. 330 (1877), Van der Wulp; Dansk videnskaberne Selskabs Skrifter, III., p. 393 (1886), Meinert; Bull. Soc. Ent. Ital., p. 228 (1896) and p. 137 (1899), Ficalbi; Ent. Mo. Mag. (2), xi., p. 281-283 (1900), Osten-Sacken; Handbk. Gnats, p. 167, 22 (1900); 2nd edit., p. 326, 42 (1902), Giles; Contribu. à l'histoire naturelle et med des Mousq., p. 128 (1901), Polaillon; Mono. Culicid. I., p. 191 (1901) and iii., p. 17 (1903), Theobald; Journ. Hygiene, II., p. 49 (1902), Cropper; C. R. Soc. d. Biol. LIV., p. 793 (1902); Les Moust., p. 160 (1905), Blanchard; Állattan, Közl. III., 32 (1904), Kertész.

(American Form.)

Keating's narrative of an expedition to the source of St. Peter's River, under the command of S. H. Long, Philadelphia, II., p. 356 (1824), Say: Auss. Zweif. Insek. I., p. 13 (1828), Wiedemann; Rept. Geo. Bot. Zool., Massachusetts, 1st ed. (1833), Harris; Silliman's American Journ. of Sc. and Arts (2), xxxvii., p. 317 (1864), Loew; Bull. No. 4, N. Sc., U.S. Dept. Agri. Div. Ent., p. 23 (1896), Howard; Handbk. Gnats, p. 162 (1900), Giles; Journ. Boston Soc. of Med. Sc. V., p. 34 (1901), Smith; Psyche, IX., p. 191 (1901), Packard; Journ. Med. Research, VII., p. 1 (1902), James.

Synonomy.—At Mr. Coquillett's request Dr. C. Ritsema compared specimens of *maculipennis* with the type of *annulimanus* in the Leyden Museum, and informed him that they are identical.

New localities.—California (Professor Kellogg). These specimens are smaller than the European specimens and are more like the Palestine and Cyprus forms. British Columbia

* Tijdschrift voor Ent. x., p. 129 (1867).

one ♂ (Dr. Dyar); New Hampshire (Dr. Dyar). Miss Ludlow (Med. Record, Jan. 20, 1906) gives the following in America: Fort Apache, Arizona; Augusta Arsenal, Georgia; Benecia, Presidia, San Francisco, California; Boise Barracks, Idaho; Fort Dade, Florida; Fort Du Pont, Delaware; Fort Fremont, S. Carolina; Fort Hancock, N. Jersey; Fort Hamilton, Madison Barracks, West Point, Fort Wadsworth, N. York; Forts Howard, Smallwood and Washington, Maryland; Forts Hunt and Monroe, Virginia; Huntingdon, Tennessee; Jackson Barracks, Louisiana; Jefferson Barracks, Missouri; Fort Logan, Arkansas; Fort Missoula, Montana; Fort Morgan, Alabama; Rock Island, Illinois; Fort Snelling, Minnesota; Connecticut (H. L. Viereck); Mississippi (Professor Glenn Herrick); various localities in Hungary (Dr. Kertész); Boulogne (F. V. T).

ANOPHELES PUNCTIPENNIS. Say (1823).

Journ. Acad. Nat. Sc. Phil. III., p. 9 (1823), Say; Ausseurop. Zweiflug. Insek. I., p. 12 (1828), Wiedemann; Ameri. Journ. Agri. and Sc. V., p. 274 (1851), Fitch; Bull. No. 4 U. S. Dept. Agri. Div. Ento., p. 23 (1896); Bull. 25 (N. S.), p. 44 (1900), Howard; Handbk. Gnats, p. 164, 19 (1900) and 2nd ed., p. 322, 36, pl. x., fig. 6 (1902), Giles; Mosquitoes, p. 240 (1901), Howard; Mono. Culicid. I., p. 189, pl. vi., fig. 24, pl. xxxvii., fig. 145 (1901), Theobald; Science, p. 329 (1901), Herrick; Les Mosquitoes, p. 167 (1905), Blanchard; Mosq. N. Jersey, p. 163 (1905), Smith; Mosq. Jamaica, p. 12 (1905), Theobald and Grabham.

Additional localities.—Port Antonio, Jamaica (Drs. Johnson and Moseley). In America it is now known from most of the Eastern United States. In N. Jersey it is the dominant species in the south; California (Professor Kellogg); New Hampshire (Dr. Dyar). Miss Ludlow gives the following localities (Med. Record, Jan. 20, 1906): Hot Springs, Arkansas; Fort Hamilton, N. York; Huntingdon, Tennessee; Fort Leavenworth, Kansas; Leon Springs, Texas; Rock Island Arsenal, Illinois; Fort Snelling, Minnesota; Fort Washington, Maryland; Fort Wadsworth and Fort Niagara, N. York; Westlawn Cem., Ohio; Fort Gill and Fort Reno, Okla; Mississippi (Professor Glenn Herrick); Connecticut (H. L. Viereck).

Observations.—The larvae may be found in all kinds of natural collections of water, both clean and foul, but prefer the former. The adults bite severely, but so far have not been connected with malaria. The general character of the larva is as follows:—

Life-history and habits.—The larva has a rounded brown

head; the mid frontal hairs are simple, the lateral branched. Between the antennae are six plumose hairs, and between the latter, nine more or less distinct pigmented spots, the largest in

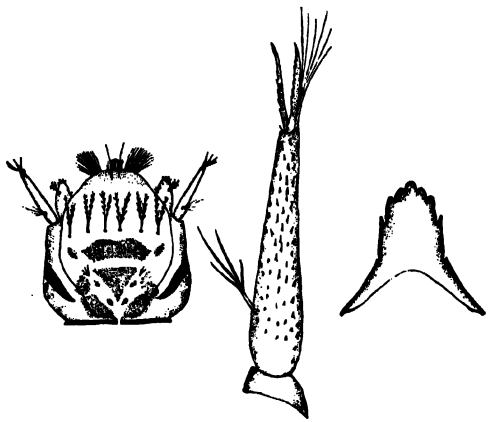


Fig. 3.
Anopheles punctipennis. Say.
Head, antenna, and labial plate (after Smith).

the centre, the others arranged around it. Antenna of two segments, the first short and immovable, the second elongate and bears two rather long spines and two short ones and a 6-branched hair; about one-third of the length from the base is a branched hair. Thorax rounded, bearing twelve long plumose hairs and some smaller ones and several single hairs. Abdomen composed of nine segments, the first two rings have two long feathered hairs on each side, the third has one, the fourth and fifth have three or four simple hairs united at their base on each side, the sixth, seventh and eighth with but one or two; besides these there are two or three short feathered hairs and several short simple ones on each side of the segments. Palmate hairs on segments three to seven; comb with about seven long teeth, and between each, one to four, shorter ones. Pupa with no special features.

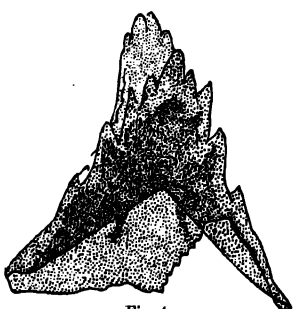


Fig. 4.
Labial plate of *A. punctipennis* (after Felt).

ANOPHELES (?) CRUCIANS. Wiedemann (1828).

Aussereup. Zweiflüg. Ins., p. 12 (1828), Wiedemann; Bull. No. 4 (N. S.) U. S. Dept. Agri. Div. Ento., p. 23 (1896), Howard; Circ. 40, 2nd se. U. S. A. Dept. Agri., p. 4 (1899); Coquillett; Bull. No. 25 (N. S.) U. S. Dept. Agri. Div. Ent., p. 44 (1900), Howard; Handbk. Gnats, p. 165, 20 (1900); 2nd ed., p. 324, 40 (1902), Giles; Mosquitoes, p. 240 (1901), Howard; Mono. Culicid. I., p. 204, 35 (1901), Theobald; Les Moust., p. 171 (1905), Blanchard; Mosq. N. Jersey, p. 169 (1905), Smith.

I have been unable to obtain any specimens of this Anophelite. The best description is that given by Smith, and judging from this it cannot be placed in *Anopheles* at all, for he says "thorax striped with greyish scales," and again, "mottled at the sides with greyish scales and with narrow stripes of scales of the same colour down the central part."

I append his description in full, leaving the generic position until I have been able to examine specimens.*

"Head dark brown, with scattered yellowish scales at the angles of the eyes and a tuft of yellowish hairs from between

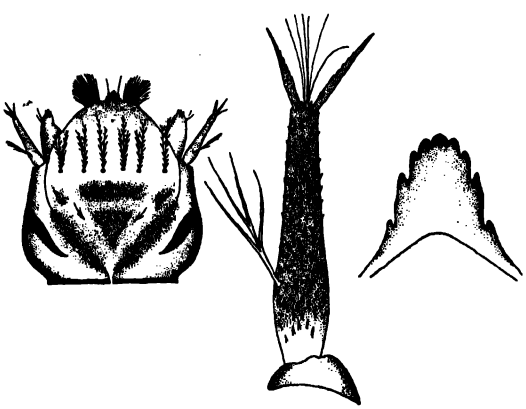


Fig. 5.
Anopheles crucians. Wied.
Head, antenna, and labium of larva (after Smith).

the eyes projecting forward over the head. Another line of similarly coloured scales forms a border to the posterior margin

* Since going to press Miss Ludlow sends me a note that the palpi have the last joint entirely white (silvery grey) and very narrow white bands at the bases of penultimate and antepenultimate joints, sometimes involving both sides.

of the eyes. Proboscis evenly dark brown. Palpi in ♀ dark brown, almost black with apical joint, base of penultimate and antepenultimate joints white. Male palpi dark brown, with the long hairs towards apex yellowish. Antennae dark brown in the ♀, paler in ♂.

"Dorsum of thorax brown, mottled at the sides with greyish scales and with narrow stripes of scales of the same colour down the central part; pleura and legs same as in *punctipennis*, but the latter not nearly so dark. Wings hyaline, with black, whitish and grey scales as follows:—Costa black; sub-costa black; radius 1 black; a few white scales at extreme apex, and some greyish ones just before the cross-vein between radius 1 and radius 2; radius 2 black, broken twice with white portions before the fork and white again at the margin; radius 3, a large portion at base black, a smaller portion black at the margin, intermediate part white; radius 4 and 5 black at the base and again at the margin, greyish and whitish scales between; media 1 and 2 greyish to the fork, with a small black patch at the cross-vein, after the fork black at both ends, white between; media 3 black at both ends, white between; cubitus 1 white at fork, then black to a little beyond cross-vein and again at margin of wing, intermediate part white; cubitus 2 white except a small black patch at margin; anal vein white, a small black portion at each end and one in the centre.

"Abdomen as in allied species, dark brown with yellowish brown hairs evenly scattered on the surface.

"*Length.*—4 to 5 mm."

Additional localities.—Cape May County, New Jersey, and a few other localities there (Delair, Port Reading, Lahaway, etc.); Fort Banancas, Florida; Fort Caswell, North Carolina; Fort Du Pont, Delaware; Fort Fremont, South Carolina; Leon Springs and Fort Ringold, Texas; Fort Monroe, Virginia; Fort Screven, Georgia; Jackson Barracks and Fort St. Philip, Louisiana (Ludlow).

Observations.—This species bites by day and night and is eager to get indoors. It is called in America the "Daylight *Anopheles.*"

The larva is described by Smith as follows:—"Length 5·5 to 6 mm.; colour dirty greyish-brown, a white dorsal stripe may be present in living specimens. Maculation of vertex variable. Second segment of antenna is shorter and does not taper as in allied species, but is blunt with two long spines serrated on one

edge and six long hairs; colour dark brown, pale yellow at base, surface set with rather large spines; the 4-branched hair larger and situated one-third the length of antenna from the base. Mandible and maxillary palpus of normal *Anopheles* form, the former with four instead of three curved spines, three of them feathered on one side; the latter with the two apical processes spatulate in form. Lateral combs consist each of a large plate, the posterior edge with seven or eight long stiff spines and with 10–12 shorter spines between them. The ninth segment rather stout, dorsal tufts and ventral fan as in others, with the dorsal plate a little larger. Tracheal gills short and stout, less than half the length of the other two species."

Note.—Unfortunately no mention is made of either frontal hairs or palmate hairs.

Synonomy.—Wiedemann's *ferrugineus* is said by Coquillett to be the same as Say's *quinquefasciatus*, and both are synonymous with *Culex pipiens*. It was at one time thought to be synonymous with *Anopheles crucians*.

ANOPHELES GIGAS. Giles (1901).

Ent. Mo. Mag. XXXVII., 196 (1901), Giles: Mono. Culicid. II., 308 (1901), Theobald; Mono. Anop. Ind., 110 (1904), James and Liston.

Additional localities.—Ceylon (E. E. Green); Deesa (Major C. G. Nurse).

ANOPHELES FRANCISCANUS. McCracken (1904).

Entomo. News, p. 9, Jan. (1904).

Head dark brown; palpi brown with light bands. Thorax dark brown at sides, pale in the middle, with median and obscure lateral lines. Legs unbanded. Wings with dark costa with two nearly equal yellow spots and a pale spot at end of each vein of fringe except sixth, rest of veins yellow and black.

♂. Head dark brown, with short dark erect scales towards the nape, emarginate and slightly forked, vertex and anterior part of occiput with short, light brown scales not forked, a tuft of light brown hairs projecting forward encircling the eyes posteriorly; eyes deep purplish brown; antennae about two-thirds length of palpi, yellowish-brown hairs, basal segment dark brown; palpi equalling proboscis in length, with emarginato scales from base to tip on under and outer surfaces, those upon outer surface dark, upon under surface light, long light hairs

covering distal third, becoming short and start at the apex; a light area at base of three distal segments, giving a slightly banded appearance; two distal segments spatulate, proboscis scaled except labella, labella covered with median stout setae, a few light hairs at apex.

Thorax: prothoracic lobes dark; mesothorax dark brown at sides, with scattered light hairs, a broad light brown patch in the middle; within this light area a median line and obscure lateral lines; scutellum light with single horizontal row of hairs; metanotum dark without hairs; halteres dark covered with thick pubescence and emarginate scales, stalks light without scales.

Abdomen, basal area of each segment light, covered sparingly with long, light hairs; two stiff hairs on posterior margin of distal segment, stout hairs on margin of genital lobes.

Legs, coxae and trochanters light, the latter, femora, tibiae and tarsi covered with short, dark, emarginate scales and setae; ungues of front legs very unequal, the larger ones with a large median tooth and small basal lobe; median ungues curved, with blunt basal lobes; posterior ungues equal, simple; posterior metatarsus slightly longer than tibia.

Wings with dark costa, with two distinct, nearly equal, yellow spots, one at distal end of sub-costal vein, one at and involving distal end of first long vein; fringe dark, with a yellow spot at the end of each vein except at the end of the sixth; the first spot carried on to the first long vein, the apical spot carried past over long vein on to the upper branch of the second long vein; the second long vein dark except for a few basal light scales; third long vein yellow in the middle, dark at the base and apex; light area at base of third long vein carried over the fourth on to upper branch of the fifth, with a few light scales at base; main branch of fifth long vein light, except at base and apex; distal half of sixth dark, except at apex, basal half light; sub-costal with a light spot carried to the first long vein (in one specimen the light spot on sub-costal missing); third long vein prolonged into basal cell; first sub-marginal cell longer and slightly narrower than the second posterior cell, stem twice the length of the cell; stem of second posterior cell prolonged to base of wing; supernumerary cross-vein adjacent to or but very shortly removed from mid cross-vein and equal to it in length when removed nearer to apex of wing; posterior cross-vein a little longer than mid cross-vein and varying in distance from it

from one-half to almost twice its own length; third long vein prolonged slightly into the basal cell, darkest scales as costal, sub-costal and first long vein.

♀. Palpi equalling proboscis in length, light area at base of three distal segments, giving a banded appearance, clothed with scales, short hairs and setae as in the ♂, distal segments not spatulate; legs with ungues equal; otherwise agreeing with the male.

Note.—No length given to this distinct *Anopheles*. It was described I find on referring to a letter from Professor Kellogg from Stanford University, California.

Localities.—Fort Brown, Fort Clark, Fort Sam Houston, Leon Springs, Texas; Benecia Barracks, California (Ludlow).

The larva is also figured but not in detail.

ANOPHELES WELLCOMEI. Theobald (1904).

First Rept. Gord. Coll. Well. Labs., p. 64 (1904).

Head black with dense white, yellow and brown upright forked scales, the white ones in front and two long hair-like projecting white tufts; palpi yellow, black at the base with two white bands on the yellow area. Thorax ashy, chestnut-brown at the sides, and with hair-like golden scales; abdomen brown, unbanded with brownish-golden hairs. Wings mostly yellow scaled, costa jet black with two yellow spots and three or four black spots on the wing field.

♀. Head black densely clothed with large upright forked scales giving it a ragged appearance, white in front, yellow in the middle, black behind and at the sides; projecting forwards are two prominent tufts of long white hair-like scales; antennae brown with pale hairs, and the basal six or seven joints with many white scales, basal segment bright reddish-brown; proboscis with basal half black, apical half ochreous; palpi not quite as long as the proboscis, basal third black scaled, apical two-thirds bright ochreous with an almost white apical band and a pure white band about one-fourth the way down.

Thorax ashy-grey with a broad dark median stripe and chestnut-brown laterally, two more or less yellowish lines on the grey median area seen only in certain lights and under two-third power, scales hair-like and pallid golden, except in front over the head, where there are grey and long narrow-curved scales; the hair-like scales form a prominent double row on each

yellow line; scutellum and metanotum pale brown; pleurae pale ochreous brown.

Abdomen brown, ochreous ventrally, with pale brown hairs, most dense on the venter.

Wings with the costa jet black, with two prominent, rich yellow spots on the apical half; apex of wing yellow; first long vein yellow with a black spot near the apex under a small apical black costal spot, traces of two smaller ones nearer the base; subcostal black; second long vein yellow with a black spot on both branches of the fork-cell just under the black spot on the first long vein; third long vein all yellow, with a minute apical black spot, and another minute one at its base just past the cross-veins; fourth long vein yellow with two dusky spots on the upper and one on the lower branches of the fork-cell, and a few on one side of its stem; fifth long vein yellow, a few black scales at the base of the upper branch, and a trace of an apical spot; sixth yellow with a black median spot; fringe black with yellow spots at the junction of all the veins with the border and the greater part of the fringe from the sixth vein to the base yellow; first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem slightly more than half the length of the cell; stem of the second posterior cell nearly as long as the cell; supernumerary and mid cross-veins in one line, posterior cross-vein about its own length distant behind the mid. Halteres with pale stem and fuscous knob.

Legs brown with very narrow apical yellow bands.

Length.—4·5 to 5 mm.

Habitat.—Baro and Pibor; also on the Jur and at Meshra (Dr. Balfour and Colonel Penton), and Aden Hinterland (Captain Peyton, I.M.S.).

Observations.—Described from several females, but all have been slightly damaged, the wings are very characteristic and approach nearest to Giles's *Anopheles gigas* from India. Dr. Balfour states that "it boarded the steamer in the evening at Baro and bit freely."

There is variation in the wing marking, especially in the size of the black spots on the wing field. It is abundant on the Baro.

Fresh specimens of this species have been taken by Colonel Penton on the Jur and at Meshra.

It has also occurred in the Aden Hinterland, specimens

having been sent me by Captain Peyton, I.M.S., who, however, does not agree that they belong to my species. I can only say they are the same as the specimens described from the Sudan.

The male has not yet been found.

ANOPHELES CORETHROIDES. n. sp.

Palpi and proboscis in both sexes deep brown. Thorax pale brown with a large median anterior, dark area, and a long lateral dark area behind. Abdomen deep brown. Legs deep brown, both unbanded. Wings very similar to those of *A. bifurcatus.*

♀. Head brown with grey sheen, and with narrow upright paler brown to dull ochreous, forked scales; clypeus large, deep brown with grey sheen; antennae deep brown with pale pubescence along the internodes; proboscis deep brown; palpi deep brown, not quite as long as the proboscis, apical segment much shorter than the long penultimate segment. Thorax pale greyish-brown with a broad dark brown median area extending from the head to about half the length of the mesonotum, broadest in front, and with a median line, and ending in two separate rounded outlines; just overlapping and passing back to the scutellum, on each side is a pale brown line; hairs brown, a median line somewhat paler; scutellum pale ochreous grey with brown border-bristles; metanotum deep brown; pleurae brown. Abdomen deep brown, paler areas on the last few segments, bristles brown and pale brown.

Legs brown with bronzy reflections, paler beneath, ungues equal and simple.

Wings with rather short fork-cells, the first sub-marginal longer and narrower than the second posterior contracted



Fig. 6.
Wing of *Anopheles corethroides.* ♀. n. sp.

apically; its base nearer the base of the wing, its stem about two-thirds the length of the cell; stem of the second posterior as long as the cell; mid cross-vein about its own length in front of the

supernumerary and posterior cross-veins. Halteres with dark knobs.

Length.—3 to 4 mm.

♂. Palpi deep brown swollen apically with scanty hairs, slightly longer than the proboscis; fore ungues unequal, the larger uniserrate; mid and hind equal and simple.

First sub-marginal cell longer and narrower than the second posterior cell, its stem as long as the cell, stem of the second posterior longer than the cell; mid cross-vein rather more than its own length in front of the supernumerary and posterior.

Length.—3 mm.

Habitat.—South Queensland (Dr. Bancroft).

Time of capture.—November.

Observations.—Described from specimens sent me by Dr. Bancroft. They look just like *Anopheles bifurcatus* at first sight, but can be told at once by the peculiar adornment of the mesonotum, which resembles that of a *Corethra*.

The form of the first sub-marginal cell is also characteristic.

ANOPHELES BIFURCATUS. Linnæus (1758).

Culex bifurcatus. Linnæus (1758).
Culex trifurcatus. Fabricius (1794).
Culex claviger. Meigen (1804).
Anopheles villosus. Robineau Desvoidy (1828).
Anopheles walkeri. Theobald (1901).

Syst. Nat., ed. x., 603, 2 (1758), Linnaeus; Fn. Suec., ed. ii., 465, 1891 (1761), Linnaeus; Syst. Nat., ed. xii., II., 1002, 3 (1767), Linnaeus; Syst. Ent., 800, 2 (1775), and Spec. Ins., II., 469, 2 (1781), Fabricius; Ins. Austr., 482, 982 (1781), Schrank; Mantissa Ins., II., 363, 3 (1787), Fabricius; Syst. Nat., V., 2887, 3 (1792), Gmelin; Fn. Boica, III., 166, 2566 (1803), Schrank; Syst. Beschr., I., 11, 1 (1818), Meigen; Brit. Ent., 210, 1 (1828), Curtis; Abbild. europ. zweifl. Ins., I. (1830); Suit. à Buff., I., 32, 1 (1834), Macquart; Ins. Lapp., 807, 1 (1838), Zetterstedt; Naturhist. Tiddsskr., II., 552, 2 (1839), Staeger; Dipt. Beitr. I., 3, 1 (1845), Loew; Bull. Soc. Imp. d. Nat. Mosc., xx., 294 (1845), Gimmerthal; Dipt. Scand., IX., 3467, 1 (1850), and XI., 4344, 1 (1852), Zetterstedt; Ins. Brit. Dipt. III., 249 (1856), Walker; Fauna. Austr., II., 625, 2 (1864), Schiner; Dipt. Neerl. (1877), Van d. Wulp; Bull. Soc. Ent. Ital., xxviii., 225, 1 (1896), and xxxi., 142, 3 (1899), Ficalbi; Natur. Siciliana, II., p. 40 (1900), Bezzi and Stephani-Perez; Bull. 25 (N.S.), U. S. Dept. Agri. Div. Ent., p. 21 (1900), Howard; Handbk. Gnats, 1st ed., 174, 26 (1900), and 2nd ed., 328, 45 (1902), Giles; Mono. Culicid., I., 195, 81 (1901), Theobald; Mosq,, p. 233 (1901), Howard; Die Malaria, 102 (1901), Grassi; Mono. Culicid., III., 19

(1903), Theobald; Állantan, Közl. III., 35 (1904), Kertész; Revis. Anoph. 23 (1904), Giles; Ann. Mus. Nat. Hung. III., 65 (1905), Theobald; Les Moust., 164 (1905), Blanchard; *Culex claviger*, Klass. I., 4, 7 (1804), Meigen; *Culex trifurcatus*, Ent. Syst., IV., 401, 3 (1794), and Syst. Antl., 35, 5 (1805), Fabricius; *Anopheles villosus*, Mém. Soc. d'Hist. Paris, III., 411, 2 (1827), Robineau Desvoidy; Bull. Soc. Ent. Ital., XXVIII., 227, 2 (1896), Ficalbi; Handbk. Gnats, 176, 28 (1900), Giles.

Further characters taken from living ♂.

The male has a V-shaped patch of creamy white upright scales in the middle of the head, the broad end towards the eyes, a bare median sulcus and the creamy scales in front long and thin, almost in the form of long narrow-curved scales, other upright scales black; a single row of thin chaetae bordering the eyes, the two outer long and far apart, then four shorter equal brown ones, then two golden ones, arising from one base, then two long pale hairs on each side. Eyes brilliant apple-green, copper and purple at junction with head.

The two apical segments of the palpi are uniformly swollen and have dull purple and coppery reflections; the apical segment shorter than the penultimate; hair-tufts brown, fairly dense on penultimate segment, apex of antepenultimate and apical segment with only a few hairs.

Length.—7 mm.

Time of capture.—May 18th.

Habitat.—Wye, Kent (F. V. T.).

Additional localities.—Hungary (Kertész).

ANOPHELES BARBERI. Coquillett (1903).

Canad. Entomo., p. 310 (1903). Coquillett; Rept. Ent. Dep. N. Jersey Agri. Exp. St., p. 671 (1906), Smith.

This species is near *walkeri*, but only about half as large, according to Coquillett. It is called in America the Tree hole Anopheles.

There is little in the short description by which one can separate it from *A. bifurcatus*, Linn., of which *A. walkeri* mihi is a synonym. Size is of no value as I have bred *bifurcatus* 3·5 mm. long. Coquillett says, the petiole of first sub-marginal cell is about one-third as long as cell, in all *bifurcatus* I have seen it has been relatively much longer, and although this is a variable character in *bifurcatus* the difference is so marked that it may be taken to be of specific value.

Moreover this species has different larval habits. It lives in tree holes with *triseriatus* and *signifer*. The larvae rarely go to the bottom, they assume a horizontal position. This species winters in the larval stage.

The specimens were collected on Plummer's Island, Maryland, in August, by Mr. H. S. Barber. Type in the U.S. National Museum (No. 6959). Other localities given are in New Jersey, at Chester and Morris County (September 6th) (J. B. Smith).

ANOPHELES EISENI. Coquillett (1902).

Journ. N. York Ent. Soc. x., p. 192 (1902), Coquillett; Revis. Anop., p. 24, 7 (1904), Giles.

Coquillett described this species from Aguna, Guatémala (2000 feet).

In his recent classification of the mosquitoes of North and Middle America Coquillett gives in the table of *Anopheles* this species under the following characters: Front margin of wings wholly black; sixth or last vein wholly black; first vein with a patch of yellow scales before its middle and another on the apex; hind tibiae yellowish-white scaled on the apical fourth.

Length.—3·5 mm.

ANOPHELES SMITHII. Theobald (1905).

The Entomologist, Vol. XXXIX., p. 101 (1905).

Head black, with a patch of frosty grey scales in front; proboscis black; palpi black, with three narrow pale bands, apex black. Antennae with outstanding scales as well as hairs on the second segment giving a tufted appearance. Thorax frosty-grey in the middle, deep brown at the sides and with a median black line and brown hair-like scales. Abdomen all black with dull golden hairs. Legs black, unbanded. Wings unspotted, the veins clothed with dense dark brown scales.

♀ Head black, with a patch of frosty-grey upright forked scales in front, dense black upright forked scales behind, over which shows a prominent tuft of large grey narrow-curved scales projecting forwards from the thorax; several thick black bristles project forwards between the eyes; proboscis and clypeus black, the former thin, palpi as long as proboscis, thin, scaly, black, with three pale bands, the apical segment black. Antennae black, the second segment with a small dense tuft of hairs on

the inner side as well as the normal long black ones. Thorax frosty-grey in the middle, showing a median dark line and a pale yellowish-brown one on each side of it in front, more or less tessellated behind, and with many small black specks, the sides deep brown, the median pale frosty area contracted in front, so that the lateral brown areas widen out anteriorly; the thin hair-like scales (hairs?) brown; scutellum and metanotum deep brown, border-bristles of former black.

Abdomen black with deep brown hairs. Legs long and thin, deep brown; ungues equal and simple, thin and rather long.

Wings clothed with dense brown stumpy lanceolate scales; the first sub-marginal cell considerably longer and narrower than the second posterior cell, its base nearer the base of the wing than that of the latter, gradually becoming acute at the base, its



Fig. 7.
Wing of *Anopheles smithii*. Theobald. ♀.

stem about two-thirds the length of the cell; stem of the second posterior cell longer than the cell; supernumerary and mid cross-veins close together, the mid a little behind the super-numerary, posterior cross-vein about its own length distant behind the mid.

Length.—3·5 to 4 mm.

Habitat.—Sierra Leone (800 feet) (Major F. Smith, R.A.M.C.).

Observations.—Described from several perfect ♀'s. It is a very dark species coming near *A. nigripes*, Staeger, but can at once be told by the denser wing scales and banded palpi. The structure of the second antennal segment is also very marked, having a tuft-like appearance. A ♀ sent by Capt. Grattan, R.A.M.C., shows traces of three minute pale costal spots, but not extending on to the outer costal border, one spot apical where the upper branch of the first fork-cell joins the costa, another on the first long vein just about the middle of the first fork-cell and another still smaller about the middle of the stem, on the first long vein.

This, perhaps, is best taken as a variety of *smithii* for I can find no structural differences.

ANOPHELES FERRUGINOSUS. Wiedemann (1828).

Auss. Zweiflüg Ins., p. 12 (1828), Wied.; Circ. 40, 2nd Se., U.S.A., Dept. Agri., p. 4 (1889), Coquillett; Mono. Culicid. I., p. 43 (1901), Theobald; Class. Mosq. N. and M. America, p. 7 (1906), Coquillett.

Coquillett shows this not to be a new species, but simply a change of name for *Culex quinquefasciatus*, Say.

The species is represented in the Vienna Museum by four specimens of a *Culex*. It is probably merely *Culex pipiens* according to Coquillett (p. 7) but he clearly means *C. fatigans*.

ANOPHELES NIGRIPES. Staeger (1839).

Naturhist. Tidsskv, II., 252, 3 (1839); Dipt. Neer. ii., 3, p. 331 (1877), Van d. Wulp; Dipt. Beitr. i., 4, 2 (1845) Low; Fn. Austr. ii., 625, (1864) Schiner; Bull. Soc. Ent. Ital., p. 226 (1896), Ficalbi; Gnats, p. 175, (1900) Giles; Mono. Culicid. II., p. 201 (1901) Theobald; K. Danske Vid. Selsk. Skrift. III., p. 395, 1, I. f. 32–35 (1886); Allant. Közle, p. 37 (1904) Kertész.

Additional localities.—Mississippi State (Professor Glenn Herrick), Fort St. Philip, Louisiana; Fort Screven, Georgia (Miss Ludlow); Hungary (Dr. Kertész).

ANOPHELES LINDESAYI. Giles (1900).

Handbk. Gnat, 1st ed., p. 166 (1900), Giles; Mono. Culicid. I., p. 208 (1901), Theobald.

Additional localities.—Reneghat, Bengal, at an elevation of 4000 feet (Capts. James and Liston, I.M.S.); Dehra Dhoon (Captain W. Thomson).

Characters of the larva.—Dr. Christophers states that frontal hairs of the larva are simple and unbranched—no thoracic palmate hairs, and that the antennae have a small branched hair, somewhat as seen in *barbirostris*.

It appears to be a hill species entirely.

ANOPHELES IMMACULATUS. James (1902).

Malaria in India, p. 45 (1902), James; Mono. Culicid. III., p. 23 (1903), Theobald.

A correction has to be made here—the specimen described seems to have come from Ennur (not Goa), a small village on the

East Coast about ten miles from Madras, and was sent me by Dr. Stephens. The letter bears Dr. Christophers' name.

When fresh Capt. James says there are three white palpal bands, an apical broad one extending over nearly half of each palp and two very narrow basal ones.

Genus **MYZOMYIA.** Blanchard.

Grassia. Theobald. Journ. Trop. Med., Vol. II., p. 181 (1902).
Myzomyia. Blanchard. C. r. Soc. Biol., Paris, Vol. XXIII., p. 795 (1902).

The following are the known species in this genus:—

1. *M. funesta*, Giles, Mem. Liv. Sch. Trop. Med. Mem. 2, p. 50 (1900); Hand-Book of Gnats, p. 162 (1900) (Central and Western Africa, Sudan, Philippine Islands).
 Kumasii, Chalmers, The Lancet, Nov. 1900, Kumasi.
 var. *umbrosa*, Theobald, Mem. Liv. Sch. Trop. Med. App. p. vi. (1900).
 var. *subumbrosa*, Theobald, idem, p. vi. (1900).
2. *M. rossii*, Giles, Journ. Trop. Med. Oct. (1899) (India, Malay States, China, Philippine Islands).
 vagus, Dönitz, Beit. Kennt. d'Anop. p. 80 (1902).
3. *M. ludlowii*, Theobald, Mono. Culicid. Vol. III., p. 42 (1903) (Philippine Islands, Malay).
4. *M. rhodesiensis*, Theobald, idem, Vol. I., p. 184 (1901) (Central Africa).
5. *M. culicifacies*, Giles (♀, non ♂), Ent. Monthly Mag. p. 197 (1901) (Central Provinces, Berars, Madras, India).
 listoni, Giles, Ent. Monthly Mag. p. 197 (1901).
 indica, Theobald, Mono. Culicid. Vol. I., p. 183 (1901).
 culicifacies, Giles, Ent. Monthly Mag. p. 197, ♀ (♂ = *turkhudi*).
6. *M. listoni*, Liston (non Giles), Ind. Med. Gaz. Vol. XXXVI., p. 12 (1901) (India, Federated Malay States).
 christophersi, Theobald, Proc. Roy. Soc. Eng. Vol. LXIX., p. 378 (1902).
 fluviatilis, Christophers (1901) ms.
7. *M. longipalpis*, Theobald, Mono. Culicid. Vol. III., p. 37 (1903) (British Central Africa).
8. *M. leptomeres*, Theobald, idem, Vol. III., p. 38 (1903) (India).
9. *M. lutzii*, Theobald, ibidem, Vol. I., p. 177 (1901) (Brazil, British Guiana).

10. *M. turkhudi*, Liston, Ind. Med. Gaz. p. 441 (1901) (India).
 culicifacies, ♂ Giles, Ent. Monthly Mag. p. 197 (1901).
11. *M. hispaniola*, Theobald, Mono. Culicid. Vol. III., p. 49 (1903) (Spain, Teneriffe).
12. *M. elegans*, James and Theobald, idem, Vol. III., p. 51 (1903) (Bombay Presidency).
13. *M. tessellata*, Theobald, Mono. Culicid. Vol. I., p. 175 (1901) (Straits Settlements).
 punctulatus, Theobald (non Dönitz), Mono. Culicid. Vol. I., p. 175 (1901).
14. *M. albirostris*, Theobald, Mono. Culicid. Vol. III., p. 24 (1903) (Malay States).
15. *M. nili*, Theobald, Rep. Gordon Coll. Lab. Sudan, p. 66 (1904) (Sudan).
16. *M. thorntonii*, Ludlow, Canad. Ent. p. 69 (1904) (Philippine Islands).
17. *M. aconita*, Dönitz, Beitr. z. d. Anopheles, p. 70 (1902) (Sumatra, Java).
18. *M. hebes*, Dönitz, idem, p. 84 (1902) (Dar-Es-Salam, East Africa).
19. *M. pyretophoroides*. n. sp.
20. *M. indefinata*, Ludlow, Canad. Entomo., p. 299 (1904) (Philippine Islands).

SYNOPTIC TABLE OF SPECIES OF MYZOMYIA.

A. Proboscis unbanded.
 1. Legs banded.
 α. Palpi with 3 white rings.
 Legs with faint apical pale bands.
 Wing fringe spotted *funesta*. Giles.
 Legs with prominent apical pale bands and a broad pale median band to fore and mid metatarsi *lutzii*. Theobald.
 Legs (hind) with apical and basal pale bands.
 Wings with 5 to 6 pale costal spots the largest T-shaped *rossii*. Giles.
 Wings with 3 yellow costal spots ... *longipalpis*. Theobald.
 β. Palpi with 2 white rings *aconita*. Dönitz.
 2. Legs spotted and banded.
 α. Supernumerary cross-vein straight.
 Palpi with 3 white bands.
 Apical and basal pale leg banding.
 3rd large costal spot with 2 spots beneath on 1st vein *ludlowii*. Theobald.
 3rd costal spot T-shaped as in *rossii* *indefinata*. Ludlow.
 Thorax with 2 ocelli, wings much spotted..... *tessellata*. Theobald.
 Palpi with 4 white bands *elegans*. James.
 β. Supernumerary cross-vein markedly curved *pyretophoroides*, n. sp.

3. Legs unbanded.
 - *a.* Apex of palpi white and ringed.
 - 3 pale palpal bands.
 - 3rd long vein mostly yellow *listoni.* Liston.
 - 3rd long vein dark.
 - Several fringe spots *leptomeres.* Theobald.
 - Two fringe spots *culicifacies.* Giles.
 - No fringe spots *rhodesiensis.* Theobald.
 - *β.* Apex of palpi white only *nili.* Theobald.
 - *γ.* Apex of palpi black.
 - Black apex narrow *turkhudi.* Liston.
 - Black apex broad *hispaniola.* Theobald.

B. Proboscis banded.
- Legs unspotted *albirostris.* Theobald.
- Legs spotted *thorntonii.* Ludlow.

Myzomyia nili. Theobald (1904).

First Rept. Gord. Coll. Well. Labs., p. 65 (1904).

Related to *Myzomyia funesta,* Giles, but easily told by its much darker hue than in the dark varieties of funesta, by the palpi having one small apical pale band only, and by the palpi and the proboscis being much shorter than the body.

♀. Head deep brown with grey upright forked-scales in the middle with a slight creamy hue, dusky ones at the sides, a creamy white tuft of hair and scales projecting forwards between the eyes; antennae deep brown with brown hairs; palpi thin, as long as the proboscis covered with black scales, the apex only pale; clypeus black with a sulcus across the middle; proboscis thin and black, apex acuminate and testaceous with a few black hairs; proboscis and palpi not nearly as long as the body.

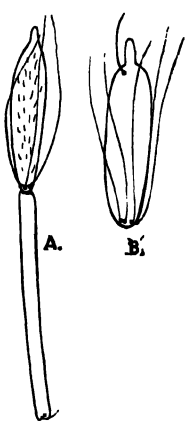


Fig. 8.
A. *Myzomyia funesta.* Giles; B. *M. nili.* Theob. Anex of ♀ antennae.

Thorax dull, pale fawn colour in the middle, dark brown at the sides, covered with scattered pale golden curved hair-like scales, a tuft of pale creamy narrow-curved ones in front projecting over the head; scutellum pale brown with many brown border-bristles; metanotum brown; pleurae pale brown with a greenish tinge. Abdomen black with rich brown hairs.

Legs brown, unbanded, with small, simple, equal ungues.

Wings mainly black scaled, with three yellow costal spots spreading evenly on to the first long vein, all the veins dark scaled, except for a small yellow spot at the base of each of the two fork-cells, and at the cross-veins, and another at the lower branch of the second fork-cell where it joins the costa, and one on the costa where the lower branch of the fifth joins it; fringe dark, except where the lower branch of the fourth and fifth veins join the border, where creamy patches occur; fork-cells both short, the base of the second posterior cell the nearer the base of the wing, both nearly equal in length, the first submarginal cell narrower than the second posterior, its stem as long as the cell, stem of the second posterior as long as the cell; supernumerary cross-vein slightly in front of the mid, the posterior nearly twice its own length distant from the mid. Halteres pale with fuscous knob.

Length.—3 mm.

♂. Head brown with bright grey sheen, the median upright forked scales creamy grey, the lateral dark brown with a median tuft of grey scales between the eyes; antennae bright ochreous brown, with deep brown verticillate hairs, the long apical segments brown, the large basal segment deep brown; proboscis long and thin, deep brown, the scales closely appressed; palpi with the last two segments swollen, the apical one ends bluntly acuminate, and is about half the length of the penultimate; the palpi are brown, except the apex, on which there are grey scales, there are also golden brown hairs on the last two segments; clypeus brown; there are also two bright golden chaetae projecting between the eyes.

Thorax deep brown with a greyish sheen, the deep brown also appearing as indistinct lines on the grey area; in front, projecting over the head, is a tuft of long, narrow-curved grey scales, its surface ornamented with golden curved hair-like scales and scanty golden brown bristles; scutellum brown, pale at the edge, with numerous pale golden-brown border-bristles; metanotum brown; pleurae ochreous brown.

Abdomen brown with a median darker line, shiny, with pale golden hairs.

Legs deep brown, thin and long, with traces of pale areas at the apices of the tibiae; fore ungues unequal, the larger uniserrated, the smaller very minute, simple, looking like a second spine to the larger one; mid and hind equal and simple.

Wings mostly black scaled, with three creamy white costal spots spreading on to the first long vein across the sub-costal, the scales are also pale on the base of the fork-cells and at the cross-veins, also on the lower branch of the fifth and on its stem and on the sixth, fringe dusky, traces of a pale area at the lower branch of fourth and upper branch of the fifth; first fork-cell considerably longer, very little narrower than the second posterior cell, its stem about two-thirds the length of the cell, stem of the second posterior longer than the cell by about half the cell's length; mid cross-vein a little nearer the apex than the supernumerary, the posterior not quite its own length nearer the base than the mid cross-vein.



Fig. 9.
Male genitalia of *Myzomyia nili*. Theobald.

Male genitalia with the claspers curved apically, where they are slightly swollen, with a longish median process between the two basal lobes, with three broad sword-shaped chaetae on each side near the apex.

Length.—3 to 3·5 mm.

Habitat.—Lado (Dr. Sheffield Neave). Jebel Akmet-Aga on the White Nile, also on the Middle Sobat (Dr. Balfour).

Time of capture.—February.

Observations.—Described from three perfect males.

The females were taken at Jebel Akmet-Aga on the White Nile, also on the Middle Sobat.

Observations.—Described from two perfect females taken by Dr. Balfour. They bear a very strong resemblance to ***Myzomyia funesta***, Giles, variety *umbrosa*, Theobald (vide Rept. Malaria Exp. to Gambia, Mem. X., Liv. School Trop. Med. App. p. 4, 1903). The main differences are as follows: The palpi and the proboscis are relatively not so long as in *M. funesta*, and they are all black save for a minute pale apical band, whilst in *funesta* there are three pale bands; the wings are much more densely scaled than in *funesta*, and the fork-cells shorter and with much longer stems than in *funesta*. I thus think it must be treated as a distinct species, owing to the shorter palpi, and not as a melanic variety.

MYZOMYIA FUNESTA Giles. (1900.)
Anopheles funesta. Giles. (1900).
Anopheles kumasii. Chalmers. (1900).

Rept. Mal. Exp. Liv. Sch. Trop. Med. Mem. p. 50, Pl. v (1900) Giles; Handbk. Gnats 1st Ed. p. 162 (1900), Giles; The Lancet, Nov. 1900. Chalmers; Handbk. Mosq., p. 162 (1902), Giles; Mono. Culicid. I., p. 178 (1901), and III., p. 34 (1903); First Rept. Gord. Coll. Well. Labs., p. 68 (1904); Ind. Med. Gaz. XXXVI., p. 361 (1901), Stephens, Christophers and James.

Additional localities.—Dr. Balfour writes that this common African species has been taken in numbers on the Blue Nile. Colonel Penton also took it on the Jur and at Meshra.

Other new localities are :—

Kamuli, Busoga in August, Ngo, Gabula's County, on the borders of Lake Kioga in August; Sambwa; Ngola Fort,

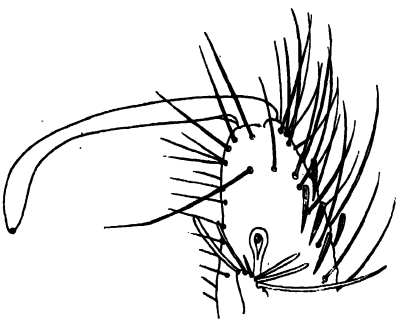


Fig. 10.
Male genitalia of *Myzomyia funesta.* Giles.

Bukedi; Lusinga Island, Kavirondo; Wadelai, Nile Provinces (Dr. Christy); Natal (Claude Fuller); Senegal; Tanganika Plateau; on the Zambesi and Congo Watersheds and up the Zambesi as far as Lupata Gorge; Philippine Islands (Miss Ludlow, "Caught in woods, hospital and quarters"); British Central Africa (F. O. Stoehr).

Note.—Stephens, Christophers and James refer to this species and *costalis* being found in India. There is no doubt that neither of these at present occur there.

Chalmers' *Anopheles kumasii* is evidently only *funesta.*

MYZOMYIA ROSSII. Giles (1899).

Anopheles rossii. Giles (1899).

Anopheles vagus. Dönitz (1903).

Journ. Trop. Med., (Oct. 1899), Giles; Handbk. Gnats, p. 149 (1900), and 2nd ed., p. 311 (1902), Giles; Mono. Culicid. I. p. 154 (1901) and III., p. 45 (1903), Theobald; Les Moustiq., p. 178 (1905), Blanchard; Ind. Med. Gaz. XXXVI., p. 364 (1901), Liston; Zeitschrift f. Hygiene XLI., pp. 80 and 86 (1903), and XLIII., p. 124 (1903), (*vagus*) Dönitz.

Additional localities.—Deesa (Major C. G. Nurse). Abundant in Ceylon (E. E. Green). It may now be said to occur commonly throughout India, Ceylon, Malay, the East Indies and Philippine Islands. It may occur anywhere up to 5,000 feet altitude.

Notes on Life-history.—The eggs have a broad fringe passing completely around them.

The larvae in the Museum show the frontal hairs simple. There are six pairs of palmate organs, each consisting of seventeen to eighteen plates with very long terminal processes.

In some districts it apparently breeds all the year.

It is fond of entering trains, boats and carriages, and is thus distributed over a wide area.

The malarial parasites will develop in it, but it has not yet been found infected naturally.

Mr. E. E. Green considers it is the malarial carrier in parts of Ceylon—especially the Batticaloa district. He found the larvae breeding in the brackish lake at Batticaloa town, and on the coconut estates he found them breeding in small water holes used for watering the young coconuts, and on some estates in earthenware chatties sunk at the base of the palms. (Tropical Agriculturist, p. 84, xxvii. 1906).

MYZOMYIA ROSSII. Giles.

var. *indefinita.* Ludlow.*

Canad. Entomo., p. 299 (1904).

This obscure insect lies between *M. rossii*, Giles, and *M. ludlowii*, Theobald, but differs in the following characters: Wing venation like *rossii* and very constant; palpal banding and general colour like *ludlowii*, also constant; femoral markings like

* Miss Ludlow now considers this a definite species.

rossii, never like *ludlowii*; wing markings very variable, and may resemble either species.

Habitat.—Philippine Islands, taken at Bayambau, Mangarin Guimaras Islands, etc.

Time of capture.—May, September and December.

Observations.—Miss Ludlow placed this as a variety of *rossii*. It seems to me to be an intermediate form between *rossii* and *ludlowii*, and as Miss Ludlow says, most nearly approaches *rossii*. It occurs with *ludlowii* at random places in the Philippine Islands.

A detailed description given by Miss Ludlow agrees in every way with the specimens she sent me.

So closely related are *rossii* and *ludlowii* that this intermediate form makes one doubt as to whether they are not all one species, but the general character of *ludlowii* and the fact that its range extends to Malaya, makes me still retain *indefinita* as distinct.

It will be interesting here to see what properly described larval characters will show, but these characters must not be given in a slipshod way that has been done; they must be noted in adult larvae, or any way, in larvae of the *same* age.

I have not seen anything like this variety outside the Philippine Islands, and should not be surprised if it proved to be a distinct species—*indefinata*.

Myzomyia ludlowii. Theobald (1903).

Mono. Culicid. III., p. 42 (1903); Ann. Mus. Nat. Hung. III., p. 65 (1905), Theobald; Journ. N.Y. Ent. Soc. x., Sep. (1902) nom nud. Ludlow; idem xi., 138 (1903), Ludlow.

Additional localities.—Singapore (Biro, 1902).

Note.—This spotted leg *Myzomyia* closely resembles *rossii*, but it seems to be quite distinct.

Myzomyia pyretophoroides. n. sp.

Thorax pale slaty grey, deep rich brown laterally, with a few pale scales in front, and pallid hair-like scales over the dorsum, and a dark median line. Abdomen deep brown, with traces of false pale basal banding; palpi of male deep brown, with four snowy white bands, apex white. Legs brown, spotted with white, and with narrow white apical bands, last hind tarsal dark. Wings with the costa, with four large and two small black spots,

the first two and the fourth spread evenly on to the first long vein; a few dark spots on the wing field.

♂. Head deep brown, with dense black upright forked scales, a small patch of white ones in front; proboscis deep brown; palpi deep brown with four snow-white bands, one apical, the first two rather closer together than the second and third, the third and fourth still further apart, scanty long brown hairs on the last two segments and the apex of the ante-penultimate; antennae with bright flaxen-brown plume-hairs.

Thorax with a somewhat irregular slaty-grey median area, deep rich brown at the sides and with a median dark line, some long grey narrow-curved scales in front, and numerous pale golden curved hair-like scales over the rest; scutellum darker in the middle than at the sides, with golden hair-like curved scales and brown border-bristles; metanotum deep brown.

Abdomen deep brown, with paler sheen at the bases of the segments, giving a basally pale banded appearance; clothed with dull golden hairs.

Legs deep brown, all the femora and tibiae spotted; first fore tarsal with five white spots, the second and third with narrow apical pale bands; first mid tarsal with five pale spots, no banding to the others; first hind tarsal with six pale spots, the following with narrow apical pale bands.

Wings with five black costal spots, the first small, the third the largest, the second about the same size as the fourth, the basal one as long as the third, but confined to the costa, the first, second, and fourth spread evenly on to the first long vein.



Fig. 11.
Wing of *Myzomyia pyretophoroides*. n. sp. ♂.

The third is spread evenly on to the sub-costal, but is broken by a pale spot near the basal end on the first long vein. The costa at the base is black, the area being about as large as the third black spot. Most of the wing dark scaled, but there are pale spots upon the upper branch of the first fork-cell under the pale

costal spots and at the base of the fork, and another near the apex of the lower branch, another on the stem at the cross-veins, and another at the base; third long vein pale scaled, with three black spots, one apical (the largest), the other two towards the base; a mixture of dark and light scales on the branches of the second fork-cell, but the stem all dark; three large dark patches on the upper branch of the fifth, one at the apex of the lower branch, and another at the base of the vein; sixth with three large black spots; fringe with pale grey spots where the veins join the costa, except at the sixth; first sub-marginal cell much longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem not quite half the length of the cell; stem of the second posterior as long as the cell; supernumerary cross-vein just behind the mid, curving round to join it; the posterior longer than the mid, not quite twice its own length distant from it; halteres with pale stem and fuscous knob.

Length.—5 to 6 mm.

♀. Wing markings similar to the ♂, but the fourth costal spot is smaller than the second, and the basal black area is represented by two small black spots; the actual base yellow. In the third vein the apical black spot is not so large as the second spot. The apical half of the lower branch of the fifth is dark scaled and the greater part of the apical half of the sixth,



Fig. 12.
Wing of *Myzomyia pyretophoroides*. n. sp. ♀.

a few pale scales, but not yellow ones, separating the long dark area; the first sub-marginal cell much longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem not quite half the length of the cell, stem of the second posterior as long as the cell; the supernumerary cross-vein nearer the base than the mid and curving round to join it, the posterior about three times its own length distant from the mid nearer the base.

Length.—6 mm.

Habitat.—Pretoria (Dr. Theiler).

Observations.—Described from two ♂'s and one ♀. It can at once be told by the peculiar curved supernumerary cross-vein and the wing ornamentation. The wing scales are as dense as in *Arribalzagia* or *Myzorhynchus.*

MYZOMYIA CHRISTOPHERSI. Theobald (1902).

Anopheles listoni. Liston (1901), (non Giles).

Anopheles fluviatilis. James (1902).

Anopheles christophersi. Theobald (1902).

Proc. Royal Soc. lxix., p. 378 (Jan. 1902), Theobald; Ind. Med. Gaz. xxxvi., 12 Dec. (1901), Liston; Mono. Culicid. III., p. 27, Theobald; Revis. Anoph., p. 28 (1904), Giles; Malaria in India, p. 31 (1902), James.

Additional localities.—Kangra Valley, 4,800 feet, in May, June and July (A. G. Dudgeon); Berars, Ellichpur; Central Provinces, Nagpur; Jeypore State, in Goa, Bombay and Aurungabad, Hyderabad State (Capts. James and Liston, I.M.S.); Ceylon (E. E. Green).

Notes on habits.—The larvae are recorded as being found in clear streamlets with grassy edges. The larvae in the Museum show the frontal hairs to be quite simple. The palmate organs have fifteen to sixteen lamellae, which have a short terminal filament, one pair occurs on the thorax as well as those on the abdomen.

It has been proved to carry malaria in the Duars.

The name *listoni* was used by Giles for a large variety of *culicifacies*, so Liston's name cannot stand.

MYZOMYIA CULICIFACIES. Giles (1901.

Anopheles listoni. Giles (1901) (non Liston).

Anopheles culicifacies. Giles (1901).

Ent. Mo. Mag., p. 197 (1901), Giles; Mono. Culicid. II., p. 309 (1901); III., p. 39 (1903), Theobald; Revis. Anoph., p. 29 (1903), Giles; Les Moustiq., p. 182 (1905), Blanchard.

Additional localities.—Deesa (August), (Major C. G. Nurse); Lahore, Mian Mir, Ferozepore in the Punjab; Madras, Ennur, Armagaon on the east coast; Nagpur in Central Provinces; Jeypore State; Goa; Bombay; Secunderabad, Aurungabad in Hyderabad State; and in the Deccan.

Notes and observations.—This species is seen to vary much in size and position of cross-veins. The larvae occur in "borrow pits" by the sides of railways, in rice fields, and in irrigation water-courses. It is also found in drying-up river beds in the Deccan, and is found in houses throughout the hot and cold weather.

It is a proved malaria carrier in the Mian Mir, Punjab, and Ennur, Madras (James and Liston).

Colonel Giles (2nd ed. Handbk. Gnats, p. 317) states the abdomen is completely clothed with yellowish and deep brown scales. There are none at all in this or any other *Myzomyia*. Its *Culex*-like position when resting is very characteristic.

The *larvae* have a pair of palmate hairs on the thorax as well as those on the abdomen, but they are not well developed; the terminal filaments are short.

MYZOMYIA TURKHUDI. Liston (1901).

Anopheles turkhudi. Liston (1901).

Anopheles culicifacies, ♂. Giles (1901).

Ind. Med. Gaz. Dec., p. 441 (1901), Liston; Mono. Culicid. III., p. 48 (1903), Theobald; Handbk. Gnats, 2nd ed., p. 330 (1903), Giles; Revis. Anop., p. 30 (1904), Giles.

Additional localities.—Nagpur, Central Provinces; Aurungabad, Hyderabad State; Kashmir (Capts. James and Liston, I.M.S.).

Economic importance.—It has been proved that under experimental conditions the parasites of human malaria are capable of developing in this species (James and Liston).

Note.—Giles, in "Revision of the Anophelinae," p. 3, says, "In Mr. Theobald's Monograph the ♂ is described as *Culicifacies*." The description was drawn up from his ♂ *type*.

MYZOMYIA. n. sp.

A single much damaged *Myzomyia* was taken at Bor by Dr. Balfour, but it is too imperfect to describe, I am sure it is a new species however. Its marked feature is the pale grey ventral surface; the wings have only two yellow costal spots and a yellow apical spot which extends on to the first long vein, another pale spot towards the base of the first long vein, not reaching the costa and the base of the vein yellowish; a pale spot at the base of each fork-cell, another at the cross-veins and

another at the marginal cross-vein; on the lower branch of the fifth a long yellow area and another faint one on the stem; fringe unspotted.

Length.—3 mm.

MYZOMYIA THORNTONII. Ludlow (1904).

Canad. Ento., p. 69 (1904).

Closely related to *M. albirostris*, Theobald, but has an additional palpal band, spotted legs and wings as in *M. elegans*, James.

" ♀ Head dark brown, with a tuft of white scales on the vertex, and white hairs projecting forward between the eyes, a few white scales around the eyes; antennae brown, verticels and pubescence white, basal segment testaceous, a few white scales on first and second segments; proboscis brown on basal half, apical half dull yellow, with a narrow brown band at the apex, extreme tip dull yellow; palpi, ultimate segment white with narrow basal brown band, penultimate also white with narrow basal brown band followed by a broad white one and the remainder of the palp brown, divided nearly in half by a narrow white band. About the middle of the exterior brown section is a small yellow spot, and there are a few yellow scales near the base of the palpus. Eyes and clypeus brown.

Thorax light brown, with white (frosty) tomentum, a dark median line, and sparsely covered with golden-brown hair-like scales and a few flat white ones on the cephalad end; *prothoracic lobes with brown flat scales;* scutellum light laterally and with a broad dark median line, hair-like golden brown scales and brown bristles; metanotum brown.

Abdomen very dark brown, rather heavily covered with brown (golden brown in some lights) hairs. Legs, coxae and trochanters all brown with a few white scales; femora and tibiae all dark brown with distinct white spots (6 or 7) on the sides; metatarsi on fore legs basally and apically white banded and a few white spots, first three tarsal segments basally and apically white banded so as to make rather broad bands, last segment brown, but giving light reflections; metatarsi and all the tarsi of the mid legs have narrow white apical bands, sometimes the metatarsi have white intermediate spots and sometimes the band on the last segment is lacking; on the hind legs the metatarsi and tarsi, except the last, have narrow white apical bands and one or two white spots. Ungues equal and simple.

Wings much spotted, costa mostly dark, a light spot at the apex extending on to the apex of first long vein, and upper fork of second long vein, a second spot a little exterior to base of second posterior cell, a third at the junction of the subcosta, a fourth at some distance from the third and two or three small ones near base of the wing. The large spots all extend on to the first long vein, and there are additional white spots on the first long vein in the area between the third and fourth costal spots,

and sometimes between the second and third costal spots, but so irregularly placed as to be of little value for identification, the two wings of the same insect varying markedly

The wing field well spotted, about six light spots on the third long vein, and the other veins spotted in much the same way, except the stem of the second posterior cell, which is dark. Fringe mottled, the light spots occurring for the most part at the apices of the veins; on the inner (short) fringed scales the light spots occur as far as the sixth long vein, on the long scales the spots are distinctly yellow as far as the fifth long vein, and are merely pale at the apices of the more caudal veins; first sub-marginal cell longer and narrower than the second posterior cell, its base nearly one-sixth of its length interior, stem of the second posterior much the longer; supernumerary cross-vein nearly equal to the mid, which it meets, and the posterior cross-vein somewhat longer and a little more than its own length distant. Halteres white.

Length.—3 to 3·3 mm.

Habitat.—Oras Samar and Cottobato, Mindanao, Philippine Islands.

Time of Capture.—June and August."

Observations.—This species was described by Miss Ludlow from specimens taken by Dr. James W. Thornton. It comes very near my *M. albirostris* from Malay, but differs in having spotted legs, an additional palpal band, and in wing markings which come nearest *M. elegans*, James.

It is subject to some variation in regard to the wing spots and leg spotting, not only in different specimens but frequently in the same insect, the two wings now and again being differently marked.

Genus **CYCLOLEPPTERON.** Theobald.

Cyclolepptteron. Mono. Culicid. II., p. 312 and III., pp. 58 (1903).

Cyclolepidopteron. n. n. Blanchard. Les Moustiques, p. 185 (1905).

Notonotricha, Coquillett, Tech. Sc. 11, Bu. Ento. U.S. Dep. Agri. (1906).

Nothing further can be added, and no new species have been found in this genus. Coquillett separates my *mediopunctata* from this genus, and has created a new one (*Notonotricha*) for it, but gives no valid character.

Blanchard has adopted a more accurate spelling, but the change seems unnecessary.

CYCLOLEPPTERON GRABHAMII. Theobald (1902.)

Mono. Culicid. I., p. 205 (1902), II., p. 312 (1902), and III., p. 56 (1903); Mosquitoes of Jamaica, p. 17 (1905), Theobald; Class. Mosq. N. and Mid. America, p. 13, Tech. Sc. 11, Bu. Ento. U. S. Dep. Agri. (1906), Coquillett.

New locality.—Cuba.

Life-history and habits.—This mosquito is an ardent blood-sucker. Some years, Dr. Grabham says, it appears to be absent on the Lignanea Plain, where he occasionally meets with it. The larvae will live in any stagnant water, and will flourish in an infusion of decaying animal matter. The adult is found most abundantly in March, April, and May

The egg.—Upper surface broad. Fringe is well developed at each end, represented by a beaded line at the attachment of the floats. Lower surface with roughly hexagonal depressions. Floats occupy the middle half of the ovum, and are widely separated below. The egg is rather longer and narrower than that of *Cellia albipes.* A captive female will readily lay eggs, depositing about fifty at a time. These are arranged side by side or in radiating groups of three or more together at the edge of the water. This stage lasts forty-eight hours.

The larva.—Colour varies greatly. Dull olive green and bluish grey shades prevail. The commonest type of ornamentation is shown in the diagram. On the thorax is a rough V-shaped mark, with its apex completed on the first abdominal segment. A snowy-white shield-shaped mark with five dark spots on it is seen on the second and third segments, a small triangular one on the fourth, and on the fifth an oval mark with an irregular dark area in the centre. The frontal hairs are very marked. The median pair are simple and long. The lateral pair are bifid, each branch ending in a tuft of hairs. The palmate hairs are on the third to seventh segments inclusive. The leaflets are jagged at the edges, and vary from fifteen to twenty. The antennae are composed of two segments. The basal are very small, the large one with small scattered spines terminating in a bifurcated hair and in two long equal thorn-like spines and three small ones. The two large ones frequently lie side by side, and so look single. In living specimens the surface of the antennal segments is marked with an undulating pattern. The figure of the palmate hairs (Fig. 35, p. 58, vol. iii.) in my monograph should show the leaflets jagged at the sides, and the antennal spine (Fig. 36a)

should be double, and the outer frontal hairs bifid and tufted, and there are only five pairs of palmate hairs, not six.

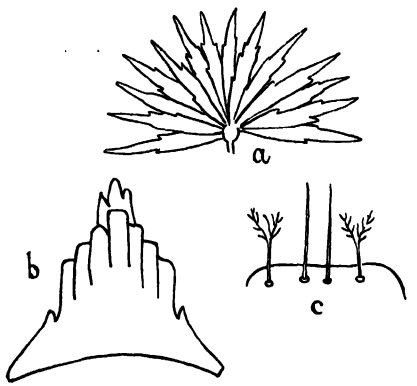


Fig. 13.
Larval characters of *Cycloleppteron grabhamii*. Theobald.
a, Palmate hairs; b, labial plate; c, frontal hairs (after Grabham).

Economic importance.—Beyond being an ardent blood-sucker, nothing is known of this insect. Probably it also is the definitive host of the malarial parasites.

Genus **FELTINELLA.** nov. gen.

Head densely clothed with upright forked scales, and a long, dense median tuft of long, thin, wavy scales projecting forward. Thorax with hair-like, curved scales, except for a median tuft in front of narrow-curved scales; prothoracic lobes with outstanding scales, looking like upright forked scales. Abdomen hairy, except basal segments of male genitalia which are clothed with flat scales; *basal lobe of genitalia, divided into two segments.*

Wings with rather large, almost spindle-shaped scales.

This genus comes near *Myzomyia* and *Pyretophorus.*

From the former it differs in the form of wing scales, scaled prothoracic lobes, and in the marked bi-segmented basal lobes of the genitalia; from the latter by the hairy thorax and genitalia again.

The female has not yet been observed.

FELTINELLA PALLIDOPALPI. n. sp.

Head deep brown with grey scales in the middle, black at the sides and a large grey median anterior tuft; proboscis deep brown, pale apex; palpi of ♂ clavate, apical segment golden yellow with small basal dark areas and a narrow pale band on the long segment. Thorax ashy-grey in the middle with a median dark line and dark brown at the sides. Abdomen deep brown with golden hair, paler apically. Wings with only two pale spots on the costa, a third basal one not reaching the border, mostly dark scaled. Legs brown, unbanded.

♂. Head deep brown with broad, upright, forked scales, creamy grey in the middle, deep brown at the sides, a long tuft of creamy hair-like scales projecting between the eyes. Palpi deep brown with the two apical segments swollen, golden yellow, with a narrow dark basal band to each and to some extent dark scales on one side, the apical one slightly smaller than the penultimate, with scanty golden-brown hairs, the long segment brown, swollen apically where it is golden yellow with a few pale hairs, and with a narrow pale band on its basal half;

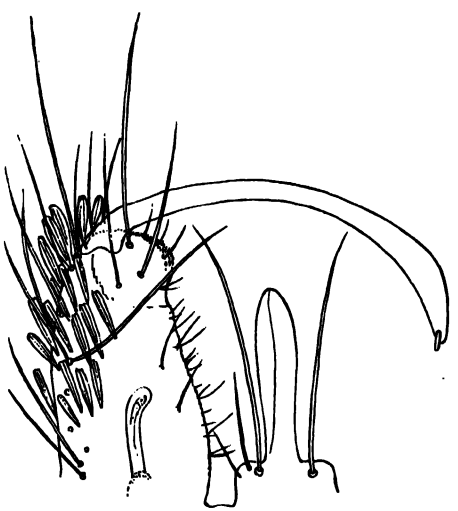


Fig. 14.
Male genitalia of *Feltinella pallidopalpi.* n. sp.

proboscis thin, deep-brown with a pale apex; antennae grey with flaxen plume-hairs, basal segment dark.

Thorax ashy grey in the middle, with slight testaceous tessellation, a narrow median dark line and traces of lateral ones on it, sides deep brown, sparsely clothed with rather long golden hair-like curved scales and an anterior tuft of creamy narrow-curved ones projecting in front; scutellum similar colour with golden hair-like scales; prothoracic lobes dark with a patch of dark outstanding scales, apparently rounded apically; metanotum testaceous with a median dark line; pleurae deep brown with grey reflections and a few pale golden hairs.

Abdomen deep shiny brown with dull golden hairs; basal segment of genitalia with dark spatulate scales; the basal lobe composed of two segments, the apical one narrower and smaller than the basal, the clasper arising from its outer corner from a deep notch; claspers sword-like and curved, slightly expanded towards the apex.

Legs deep brown, unbanded, rather pale basally; fore ungues very nearly equal and simple, mid very unequal, the larger uniserrate; the smaller very minute; hind equal, simple, very small.

Wings with two prominent yellow spots on the outer costal border and a third which does not actually reach the costal vein; the first at about the level of the middle of the first fork-cell and spreads evenly on to the first long vein, the second is just in front of the cross-veins and also spreads evenly on to the first long vein, the third is more basal and occurs on the first long vein and on the under part of the costal vein; there is also a small



Fig. 15.
Wing of *Feltinella pallidopalpi.* n. sp. ♂.

pale apical spot; a pale area at the base of the first fork-cell, another at the cross-veins, a trace of one on the third long vein towards its basal area and a few pale scales elsewhere but nowhere forming spots, rest of wings dark scaled; fringe unspotted; first sub-marginal cell considerably longer and narrower than the second posterior cell, its base slightly nearer the base of the wing, its stem nearly as long as the cell; stem of

the second posterior longer than the cell; mid cross-vein just a little posterior to the supernumerary, the posterior about its own length distant from the mid; scales large, bluntly lanceolate to almost spindle shaped.

Halteres pale ochreous.

Length.—4·8 to 5 mm.

Habitat.—Mount Aureol, Sierra Leone (Captain Grattan).

Time of capture.—February (21. 04).

Observations.—Described from three ♂'s. One bears a note "taken in bush." It is very marked, the golden-yellow banded palpi and quaint genitalia at once separate it.

One specimen shows the third border spot reaching the upper edge of costa, the others do not.

Genus **STETHOMYIA.** Theobald.

Journ. Trop. Med. V., p. 181 (1902); Mono. Culicid. III., p. 62 (1903); Genera Insect (Fam. Culicid.), p. 8 (1905).

This genus now contains four species. The character given previously of the mammillated prothoracic lobes is not of any diagnostic value as it is seen in other genera.

The main character separating the genus from other *Anopheline* genera is the presence of flat scales on the middle line of the head and the very thin upright forked scales.

Three of the four species are Asiatic, the fourth South American.

They tabulate as follows:—

A. Thorax with a silvery median and lateral lines.
 Black species *nimba.* Theobald.
B. Thorax unadorned.
 Thorax with long, irregular, deep brown hairs *gracilis.* Theobald.
 Thorax with a few white hair-like scales *culiciformis.* James and Liston.
 Thorax with hair-like brown curved scales and frosty-grey tomentum *pallida.* Ludlow.

Group B has the cephalic scales not quite so flat as in A, and may possibly form a distinct genus.

STETHOMYIA FRAGILIS. Theobald.

The Entomologist, Vol. XXXVI., p. 257 (1903), Theobald; Revis. Anop., p. 26 (1904), Giles.

Thorax ochraceous-brown; abdomen, legs, palpi and proboscis deep brown; antennae white with brown plume-hairs. Legs long, delicate.

♂. Head deep brown, with small flat creamy scales between the eyes and partly above; narrow brown upright forked scales behind; eyes deep purple; proboscis long and thin deep brown, paler at the base; antennae with testaceous basal segment, apex brown, remainder white with narrow brown rings and brown plume-hairs; palpi pale brown, with deep brown scales, last two segments swollen, with a few black bristles; head united to the thorax by rather a long neck.

Thorax bright ochraceous brown, almost nude, a few scattered long irregular deep brown hairs; scutellum pale greyish-brown, nude; the pale brown border-bristles alternately long and short; pleurae ochraceous brown with a greyish sheen; metanotum chestnut-brown; prothoracic lobes ochraceous brown with a few black bristles, very distinctly mammillated.

Abdomen very narrow, expanding apically, deep brown to almost black, with longish curved black hairs; genitalia pale testaceous; claspers long and thin.

Legs long and thin, deep brown; coxae very pale; fore legs with apparently only one claw, which is large and biserrated, one tooth being basal; mid ungues equal, simple, moderately large and curved; hind small, equal and simple and nearly straight.

Wings with the veins with pale brown lanceolate scales; those on the sub-costal, first long vein and basal part of the costa short and rather broad; first sub-marginal cell very long and narrow, nearly twice the length of the second posterior cell, both cells about the same width; base of the first sub-marginal a long way nearer the base of the wing than the base of the second posterior; stem of the second posterior nearly twice as long as the cell; mid cross-vein a little nearer the apex of the wing than the supernumerary; the posterior cross-vein about half its length nearer the base of the wing than the mid.

Halteres with pale stem and slightly fuscous knob, which is curved in the middle.

Length.—4 mm.

Habitat.—Kuala Lumpur, Federated Malay States (Dr. Durham).

Time of capture.—January and December.

Observations.—Described from two ♂'s bred by Dr. Durham.

It is a very delicate-looking species, and differs completely from the dark *Stethomyia nimba*, Theobald (Mono. Culicid. III., p. 62).

Type in the British Museum (Nat. Hist.). Dr. Durham sends me the following note concerning this species:—

"Sunday, Jan. 18, 1903. Larvae and pupae collected about two miles away (from Kuala Lumpur) in a pool in the jungle. Clear water pool, surrounded and more or less hidden by shrubs and ferns; looks as if it might have been a drinking-water dripping well since abandoned, about four feet in diameter and two or three feet deep, near a stream and some dried-up swamp where *Culex mimeticus* larvae had been caught. Numerous small dark *Anopheles*-like larvae which all died before transforming; there were also some quite minute pupae. Only two hatched out."

STETHOMYIA PALLIDA. Ludlow (1905).

Canad. Entomo. Vol. XXXVII., p. 129 (1905).

Testaceous and brown; thorax unadorned, but with frosty tomentum and hair-like brown curved scales. Legs long and thin, light, with small, thin, brown scales showing purple iridescence or fawn colour. Wings unspotted. Prothoracic lobes apparently stalked.

"♀. Head light testaceous, a few white flat lanceolate scales on the vertex, otherwise clothed with sparsely set slender hair-like curved brown scales, nearly as long as the very slender fork scales which occur on the occiput. Head shows no sign of having been denuded, and besides the slender hair-like scales it is covered with a short fine tomentum or frostiness such as is often seen in Anophelina. Antennae brown, verticels brown, pubescence white, basal segment testaceous with frosty tomentum; palpi long and slender, covered ventrally with short fine hairs of the frosty tomentum, dorsally with small flat brown scales, a couple of bristles or long hairs at the apex; proboscis light brown, covered with very thin flat scales and curved hair-like scales, a few bristles at the base, tip lighter, eyes dark brown; clypeus light, with frosty tomentum.

Thorax light testaceous, sparsely covered with hair-like brown curved scales and frosty tomentum, prothoracic lobes a little darker, and with curved hair-like scales; scutellum like mesonotum; pleurae light, with a few groups of hair-like curved brown scales; metanotum brown.

Abdomen apparently mottled brown and light, but this may be due to drying, and clothed with rather long brown hairs. Legs unusually long and slender; coxae and trochanters light, with a few hair-like curved brown scales. Remainder of the legs light, covered with small, thin brown scales, which, in some lights however, look much darker, with almost purple iridescence, in other lights almost fawn colour. Ungues equal and simple. Wings clear, brown scaled, with lanceolate scales; first sub-marginal cell extremely long, nearly twice as long as the second posterior cell and a little narrower, the stem about half the length of the cell, and a third shorter than that of the second posterior; cross-veins close together, and all about the same length, the supernumerary about half its length interior to the mid, and the posterior about its own length interior to the mid. Halteres, stem light, knob dark.

Length.—3·5 mm. (legs more than 10 mm.).

Habitat.—Camp Stotsenberg, Angeles, Pampanga, Luzon, Philippine Islands.

Time of capture.—September (?)."

Observations.—This species was described by Miss Ludlow from a perfect specimen sent by Dr. Whitmore, and was caught in the woods. Miss Ludlow says, "In spite that the prothoracic lobes are not mammillated and indeed seem stalked, the other characteristics point strongly to *Stethomyia*." I am not sure myself, as I have not seen a specimen; but it appears to me to belong to a new though allied genus, for the *flat spatulate* head scales of *Stethomyia* seem to be replaced by others.

STETHOMYIA (?) CULICIFORMIS. James and Liston (1904).

Anopheles culiciformis. James and Liston.

Mono. Ind. Anop., p. 122 (1904).

Allied to *S. nimba*, but the ♂ fore ungues are single.

"Palpi are entirely covered with brown scales; without any bands; rather shorter than the proboscis.

The head is chiefly covered with brown upright forked scales, but there are a few white spindle-shaped scales in the middle line in front; there is no distinct frontal tuft of hairs. There are rather more numerous and stronger brown hair-like bristles around the eyes and on the front of the head than is usual in other *Anopheles*.

Thorax covered with a few white hair-like scales and many long brown bristles. Prothoracic lobes distinctly mammillated, as in Theobald's *Stethomyia nimba*. Scutellum with long brown bristles; in the middle there are a few short scale-like bristles.

Abdomen brown, covered with numerous fine golden and coarse brown

hairs. Wings unspotted and covered with rather broad spindle-shaped scales approximating in shape those of *nigerrimus*. Venation as in other *Anopheles*. Transverse veins almost in one line.

Halteres with light stem and dark brown knob covered with brown scales.

Legs long and thin, entirely brown, and covered with scales.

The male of this mosquito differs from all other *Anopheles* in that the claws on the forelegs are single and uniserrated. There are structural differences too in the larva which differentiate this mosquito from all others.

Characters of the larva.—Frontal hairs simple and unbranched; median hairs very close together and long; the external angular very short. The most characteristic and constant feature of this larva is the peculiar structure of the 'basal hair.' In most *Anopheles* this hair is much branched; in the larva of this species it is made up of a long stalk covered with a few hairs; the extremity appears as if jointed to the stalk, and is somewhat swollen and covered with a corona of fine hairs. The next point in which the larva differs from other *Anopheles* is that the 'balancer' hair on the third abdominal segment is simple and unbranched. A third peculiarity is found in the fact that well-developed palmate hairs are found on all the abdominal segments except the first and last, and there is also a pair on the thorax. The shape of the leaflets of each palmate hair most nearly resembles that of the leaflets of the palmate hairs of the larvae of *barbirostris*. There is no well defined blade as contrasted with the terminal filament in each leaflet.

Habitat and observations.—This mosquito was bred from larvae collected near Karwar, in the Bombay Presidency, by Dr. Coghill.

Note.—Dr. Coghill separated this species from *A. aitkeni* by its *culex*-like attitude when at rest. It was confused with the former species."

Genus **PYRETOPHORUS.** Blanchard.

Pyretophorus. Blanchard. C. r. Soc. Biol. Paris, n. 23, p. 795 (1902).
Howardia. Theobald. Journ. Trop. Med., Vol. 5, p. 181 (1902).

The following are the known species in this genus :—

1. *P. costalis*, Loew, Ent. Zeit. Berl., p. 55 (1866) (Africa, Mauritius).
Anopheles costalis, Loew, Ent. Zeit. Berl., p. 55 (1866).
Anopheles gambiae, Giles, Handb. of Gnats (2 ed.), p. 511 (1902).
Anopheles gracilis, Dönitz, Beitr. Kenntn. Anoph., p. 76 (1902).
var. *melas*, Theobald, Mono. Culicid. Vol. 3, p. 76 (1903).

2. *P. minimus*, Theobald, Mono. Culicid. Vol. I., p. 186 (1901) (Hongkong).
3. *P. marshallii*, Theobald, idem, Vol. III., p. 77 (1903) (Mashonaland).
4. *P. chaudoyei*, Theobald, ibidem, Vol. III., p. 68 (1903) (Algeria).
5. *P. superpictus*, Grassi, Reale Accad. Linc. (Stud. Zool. sulla Malaria), p. 78 (1900) (S. Europe).
6. *P. palestinensis*, Theobald, Mono. Culicid. Vol. III., p. 71 (1903) (Palestine, Cyprus).
7. *P. jeyporensis*, Theobald, idem, Vol. III., p. 66 (1903) (Jeypore, India).
8. *P. cinereus*, Theobald, ibidem, Vol. I., p. 161 (1901) (S. W. and Central Africa).
9. *P. atratipes*, Skuse, Proc. Linn. Soc. N. S. Wales, Vol. III. (2), p. 1755 (N. S. Wales, Queensland).
10. *P. ardensis*, Theobald, Journ. Eco. Biolo. I., 1, p. 17 (1905) (Natal).
11. *P. myzomyfacies*. n. sp. (Algeria.)
12. *P. sergentii*. n. sp. (Algeria.)
13. *P. austenii*, Theobald, Entomo. XXXIX., p. 102 (1905) (Angola).
14. *P. aureosquamiger*. n. sp. (Pretoria.)
15. *P nigrifasciatus*. n. sp. (Peshin, India.)
16. *P. nursei*. n. sp. (Quetta, India.)
17. *P. merus*. Dönitz, Zeitschrift für Hygiene, XLI., p. 77 (1903) (S. & E. Africa.)
18. *P. leucosphyrus*. Dönitz, Ins. Borneo, V. p. 37 (1901) (Sumatra, Borneo).
19. *P. elegans*. James, Mono, Culicid. III. p. 51 (1903) (Karwar).

SYNOPTIC TABLE OF PYRETOPHORUS.

A. Legs unbanded.

α. Palpi with 3 pale bands; apex black..... *nigrifasciatus*. n. sp.

αα. Palpi with 3 pale bands; apex white.

β. Wings with 4 large and 2 small black costal spots; mid cross-vein very long *nursei*. n. sp.

ββ. Wings with 4 large black spots; mid cross-vein normal *minimus*. Theobald.

ββ. Wings with 5 large black costal spots; 1st fork-cell much longer than the second posterior *sergentii*. n. sp.

1st fork-cell about as long as the 2nd cell..... *palestinensis*. Theobald.

B. Legs banded.

γ. Legs with apical banding.

Hind legs only banded.

Palpi black apex and 3 pale bands.

3 dark lines on mesonotum *myzomyfacies*. n. sp.

2 dark lines on mesonotum *chaudoyei*. Theobald.

γγ. All legs with apical pale bands.

Palpi with 3 white bands.

Wings with 4 black costal spots; fringe unspotted *superpictus*. Grassi.

Wings with 4 large and 2 small costal spots; fringe spotted; apical palpal band broad, other 2 small *jeyporensis.* Theobald.
Apical and median palpal bands broad *austenii.* Theobald.

$\gamma\gamma$. Fore and hind legs with apical pale bands.
Four white palpal bands *cinereus.* Theobald.

C. Legs spotted and banded.

α. Last 3 hind tarsals all white.
Thorax golden scaled..... *aureosquamiger.* n. sp.

$\alpha\alpha$. Last hind tarsal not white.

β. Femora and tibiae spotted.
Tarsal bands apical.
3 palpal bands.
Apical one broad, others narrow ... *costalis.* Loew.
Apical and median ones broad ... *marshallii.* Theobald.

$\beta\beta$. Femora, tibiae and first tarsals spotted.
Tarsal bands apical.
4 palpal bands *ardensis.* Theobald.
A broad tibio-metatarsal joint band.
Mid legs banded *elegans.* James.
Mid legs unbanded *leucosphyrus.* Dönitz.

P. merus, Dönitz, comes near *cinereus*, but in this Table near *costalis*—the wing fringe spots are broader than in that species.

P. atratipes, Skuse, may also come in this genus—the palpi are only white at the tip. Legs unbanded.

Pyretophorus nigrifasciatus. n. sp.

Head with pale grey scales in front, black behind; palpi with narrow black apex and three white bands, the two apically situated ones closer together than the middle and basal. Thorax ashy in the middle, deep brown at the sides; clothed with narrow, curved, pale creamy scales. Abdomen deep brown, with golden hairs. Legs deep brown, unbanded. Wings mostly creamy scaled, four moderate-sized black costal spots and two small basal ones, the large ones spread evenly on to the first long vein.

♀. Head deep brown, with dense, upright, creamy-white scales in front, deep black ones behind, all rather broadly expanded apically, a tuft of long creamy white ones projecting between the eyes; antennae brown, basal segment bright testaceous, with a few pale scales on the basal segments; pubescence pale; palpi deep brown, rather thin, with dark apex, the dark band being about the same size as the next pale band, the second pale band nearer to the first than it is to the third.

Thorax ashy grey in the middle, deep brown at the sides,

clothed with rather long and broad, flat, narrow-curved scales of a dull creamy hue, with brown chaetae which become golden over the roots of the wings; scutellum pale brown, with similar scales to the mesonotum and brown border-bristles, metanotum deep brown.

Abdomen deep shiny brown, with golden and brown hairs.

Legs brown, unbanded, with a pale spot at the apex of the hind femora and tibiae; ungues equal and simple.

Wings creamy yellow scaled with black spots, four moderately large ones and two small basal ones on the costa, the dark areas about equal in extent to the pale, and the four large spots spreading quite evenly on to the first long vein, except that the third is perhaps not quite so long as on the costa; two dusky areas on each branch of the first fork-cell and one large one on the stem on each side of the cross-vein; third long vein with a spot at the base and apex; the fourth with two dusky spots on the upper branch, one near the apex on the lower and dusky scales on the stem; the fifth with three on the upper branch, one at apex of lower, and one near the base of the vein; sixth with traces of two dusky spots; fringe with pale areas, except where the sixth joins the costa; first sub-marginal cell longer and narrower than the second posterior cell, its base slightly nearer the base of the wing, its stem about two-thirds the length of the cell; stem of the second posterior as long as the cell; supernumerary and mid cross-veins in one line, posterior cross-vein short, nearly twice its own length distant from the mid. Halteres deep ochreous, with slightly fuscous knob.

Length.—5·5 mm.

Habitat.—Peshin, India (Major C. G. Nurse).

Time of capture.—April.

Observations.—At first sight this species, which has very large wings, might be mistaken for *Myzomyia turkhudi*, but a casual examination of the thorax shows the pale curved type of scales, showing it to be a *Pyretophorus*.

The black-tipped palpi will separate it from other *Pyretophorus*.

PYRETOPHORUS NURSEI. n. sp.

Head with white scales in front, deep brown behind; palpi long and thin, brown with three white bands, the third apical, about equi-distant. Thorax ashy grey, dark at the sides, with narrow-curved pale grey to white scales. Abdomen pale shiny

brown with the apices of the segments dark and with brownish hairs. Legs brown, unbanded. Wings with four large and two small basal dark costal spots; first, second and fourth spread uniformly on to the first long vein, the third is smaller on the first long vein.

♀. Head brown with upright forked white scales in front, dark behind, and with a white tuft projecting between the eyes; proboscis and palpi long and thin, the former brown, the latter with three equi-distant dull white bands, one apical; antennae deep brown, basal segment and base of second segment yellow, a few white scales on some of the basal segments.

Thorax bright ashy-brown in the middle with narrow-curved pale scales and a darker median line, the sides deep brown; in some lights the median area has a light brown appearance, but with the scales it appears ashy-grey; scutellum pale greyish-brown with pale narrow-curved scales and pale brown border bristles; metanotum bright brown.

Abdomen pale shiny brown, tessellated with darker brown, the apical borders of the segments dark; hairs pale brown to pale golden.

Legs brown, unbanded; a pale spot at the apices of the femora and tibiae; ungues equal and simple.

Wings scaled with black and yellow, four large and two small costal spots, the apical one small, the third and fourth about equal size, the second not quite so long as the third, the first, second and fourth spread evenly on to the first long vein, the third has the black area on the first vein not as long as the costal area which overlaps it at *each end*; the two basal spots do not reach the first vein; wing field with a few dusky spots especially at the region of the cross-veins; first sub-marginal cell slightly longer and narrower than the second posterior cell, its base slightly nearer the apex of the wing, its stem as long as the cell, both branches of the vein prominently curved; second posterior cell with its stem as long as the cell; supernumerary cross-vein small, rather more than its own length nearer the apex of the wing than the mid, the latter very long rather more than twice the length of the supernumerary; posterior cross-vein small, about the size of the supernumerary, sloping backwards and nearly twice its own length distant from the mid; halteres with pale stem and fuscous knob.

Length.—5·5 mm.

Habitat.—Quetta, India (Major C. G. Nurse).

Time of capture.—November.

Observations.—Described from a single ♀. Its wing markings and general appearance resemble *P. nigrifasciatus*, but the white apex to the palpi at once separates it. The marked specific character is in the venation, notably the much curved branches of the second long vein and the abnormally long mid cross-vein.

PYRETOPHORUS SERGENTII. n. sp.

Thorax slaty grey in the middle, deep brown at the sides (in some lights dark brown in centre, dull ochreous at sides), with narrow-curved pale scales. Palpi with three pale bands, apex white. Wings dark scaled; costal border with five large dark spots, four spreading evenly on to first long vein; a few pale spots on wing field, notably at the cross-veins and bases of the fork-cells.

♀. Head brown with grey median and brown lateral upright-forked scales. Proboscis thin, brown, with yellow labellae. Palpi with three pale bands, one apical, the two apical ones closer together than the second and third. Thorax slaty-grey in the middle with three rather obscure longitudinal dusky lines, sides deep rich brown (in some lights the thorax appears dark brown in the middle, with dull ochreous sides and then deep brown laterally), with narrow-curved pale almost grey scales, which are widest and most prominent in front, especially in the median area; a few deep brown specks over the grey surface; scutellum slaty grey with a dark median area and pale golden border-bristles.

Abdomen brown with dull golden to brown hairs.

Legs brown, unbanded.

Wings with the outer costal border with five nearly equal black spots, the first four spreading uniformly on to the first long vein, the basal one not doing so, the apical spot slightly smaller than the others; most of the veins uniformly dark scaled, a pale spot at the base of each fork-cell, at the cross-veins, one on the lower branch of the fifth vein and one on the stem, and a pale area towards the base of the sixth; there is also a pale spot at the apex of each vein where it joins the costa; fringe with a pale spot where the veins join the costa, except the sixth long vein; apex yellow; first sub-marginal cell much longer and slightly narrower than the second posterior cell, its base nearer the base of the wing, its stem rather more

than half the length of the cell; stem of the second posterior cell slightly longer than the cell; mid cross-vein, slightly behind



Fig. 16.
Wing of *Pyretophorus sergentii*. ♀. n. sp.

the supernumerary, posterior about its own length distant from the mid.

Length.—4·8 to 5 mm.

Habitat.—Algeria (Dr. E. Sergent).

Observations.—Described from two ♀'s. The wings present very marked differences to any African *Anopheline* yet described.

PYRETOPHORUS MYZOMYIFACIES. n. sp.

Palpi with black apex and three pale bands. Wings with six black costal spots, the large median one represented by two small spots on the first long vein. Legs with minute pale apical bands to hind tarsals.

♀. Head similar to *chaudoyei*, but there are no other than upright forked scales. Thorax with three dark longitudinal lines on the ochreous brown surface, and with narrow-curved pale scales, of uniform size all over the thorax. Abdomen brown with pale and dusky golden hairs.

The wings have six dark spots on the outer costal border, the apical one small and spreading evenly on to the first long vein, the second larger and spreading evenly on to the first long vein, the third much larger spreading evenly on to the sub-costal vein but represented by a spot at each end only on the first long vein; fourth spot slightly smaller than the third, that beneath it on the sub-costal a little shorter, and the one on the first long vein smaller still, the two basal spots about equal in size and not spreading on to the veins beneath; the upper branch of the first fork-cell has two dark areas, the lower one small near apex and a larger one towards the base of the fork, a small one just below the fork and another near the super-

numerary cross-vein; the third long vein has two dark spots; the second fork-cell two on its upper, one on its lower branch, and a large one on each side of the cross-vein on the stem; the

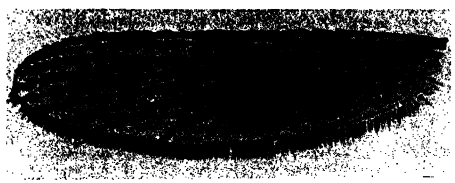


Fig. 17.
Wing of *Pyretophorus myzomyiformis* (♀.) n. sp.

fifth with two small spots on the upper branch, one on the lower, a small one just past the cross-vein, and one near the base; the sixth has three small dark areas.

The first sub-marginal cell is longer and narrower than the second posterior cell, and its base is nearer the base of the wing; the stem of the first sub-marginal cell is about two-thirds the length of the cell; stem of the second posterior cell longer than the cell; posterior cross-vein not quite its own length distant from the mid cross-vein; mid a little nearer the base than the supernumerary.

Legs brown; no traces of banding in the fore and mid pair, but there are minute apical yellow bands to the posterior tarsal segments, and pale knee spots.

Length.—5 mm.

Habitat.—Algeria (Dr. E. Sergent).

Observations.—Described from three ♀'s. It comes very near *P. chaudoyei*, Theob., but can at once be told by the wing ornamentation as well as the thoracic adornment—*chaudoyei* has two, this species three dark lines on the mesonotum.

PYRETOPHORUS JEYPORENSIS. James (1902).
Pyretophorus jeypurensis. Theobald (1903).

Sc. Mem. Ind. N. Sc. No. 2, p. 32 (1902), James; Mono. Culicid. III., p. 66 (1903), Theobald; Revis. Anop., p. 35 (1904), Giles.

A female sent by Dr. Christophers in 1903, shows the following variations in the wing markings: the third long vein has a large dark area near its origin just past the cross-vein, and a

small one near the apex, and the sixth long vein has three black spots, the basal one being small.

It was described by Capt. James shortly before Vol. III. of the work appeared. His description did not reach me till some time afterwards, specimens having been sent him by Drs. Stephens and Christophers as well as to myself to describe.

Additional localities.—Central Provinces, Nagpur (Capt. James, I.M.S.); Jakot, South India (Mr. Aitken); Bombay.

PYRETOPHORUS AUSTENII. Theobald (1905).

The Entomologist, Vol. XXXIX., p. 102 (1905).

Head black, with grey scales in front; proboscis black; palpi with two broad snowy-white bands, the last forming a white apex, and a third very narrow one. Thorax brown, clothed with silvery-grey scales, also scutellum. Abdomen black, with golden hairs. Legs black, with apical white tips. Wings with black and white patches of scales, costa with two small white spots, and traces of a minute third spot towards the base; most of veins pale-scaled, but prominent black spots at the base of the second posterior cell and apex of the lower branch of fifth long vein.

♀. Head black, with upright snowy-white forked scales in front, black ones behind; proboscis black; palpi black scaled, densely at the base, with two broad white bands towards the apex, one forming the apex of the palpi, and a third small one towards the basal half. Thorax black, with scattered broad curved snowy-white scales also the scutellum. Abdomen black, densely clothed with golden hairs; the two lobes with black scales.

Legs black, the apices of all the segments, except the last in the fore and mid legs, with a narrow white band; in the hind legs all the segments are banded; ungues equal and simple, rather long.

Wings with dense *Pyretophorus*-like scales; the costa with three white spots, the apical one large, the second smaller, and the third very small; all three spread fairly evenly on to the first long vein, which has in addition a small white spot between the two apical costal ones, and another near the third spot, its base mostly white. On the base of the costa is another small white spot not reaching the top of the costa; the branches of the third long vein are black at the tips and bases near the fork,

and there is another black patch near its base; third long vein pale, except for a black spot near the apex, and two near the base; the fifth has two black spots near the apices of its branches, a large black-scaled area in front of and including the base of the fork and its stem near the fork, rest of the vein pale-scaled; the sixth has three black spots, the median one the largest; wing fringe with a pale area at the junction of all the veins. First



Fig. 18.
Wing of *Pyretophorus austenii* (♀). n. sp.

sub-marginal cell considerably longer and a little narrower than the second posterior cell, its base nearer the base of the wing, its stem about one-fourth the length of the cell; stem of the second posterior cell rather more than two-thirds the length of the cell; supernumerary cross-vein a little behind the mid, posterior about its own length distant behind the mid; posterior border-scales of the fringe long, narrow and curved.

Length.—5 mm.

Habitat.—Bihé, Angola (Dr. Creighton Wellman).

Observations.—Described from a single perfect female. The chief characters are in the thoracic squamose structures and marked wing ornamentation.

PYRETOPHORUS PITCHFORDI. Power (in Giles) (1904).

Revis. Anop., p. 34 (1904), Giles.

The following is the original description:—

"Wings clothed with narrow lanceolate scales; costa black at apex, pale at absolute base, with three large yellowish spots, approaching the dark parts in length, and two basal dots; rest of veins mainly pale, but with several longish black marks; notably two on VI; fringe spotted at all junctions. Legs dark but for apical femoral and tibial spots, and the tarsals minutely apically pale-banded. Thorax dark with a broad band of white bloom in the middle and clothed with hair-like yellow scales behind, and creamy narrow-curved ones in front. Abdomen black, clothed both

dorsally and ventrally with long golden hairs. The black scales near the fork of V on the wing, are blunt-ended.

♀. Head black, with a few black forked scales behind and clavate white scales between the eyes, succeeded by white spindle-shaped scales on the front and a rather scanty double white frontal tuft; palp moderately densely black-scaled, the outer fourth of the appendage white, with a narrow black band, and a smaller white band nearer the base, proboscis black with yellow tip; antennae with a long second joint clothed with white scales. Pleurae mostly fuscous. Halteres with densely black scaled knobs. A very slender-built dark looking mosquito.

Length.—About 4 mm.

Habitat.—Zululand, 80 miles N. of Eshowe, in bushy country, at an elevation of 1500 feet. This valley is said to be notoriously malarious, according to Dr. Power."

PYRETOPHORUS AUREOSQUAMIGER. n. sp.

Thorax deep slaty-grey in the middle, deep brown on each side with golden spindle-shaped scales. Palpi deep blackish-brown with four white bands. Abdomen deep blackish-brown with dull golden hairs. Legs deep brown, spotted with pale yellow and banded with white, the last three hind tarsals all white. Wings mostly dark-scaled, with three white costal spots.

♀. Head black with ochreous upright forked scales in the middle, dark ones behind, and to some extent at the sides, and some irregular narrow-curved and flattened pale creamy ones in front, and some pale hair-like scales projecting forwards. Palpi clothed with deep blackish-brown scales with four rather narrow pure white bands, one apical, the second rather close to it, the third further off, and the fourth further off still; proboscis thin, almost black; antennae brown with paler bands.

Thorax deep slaty-grey in the middle, deep brown at the sides, clothed with short, rather broad, closely appressed rich golden scales; dark brown chaetae over the roots of the wings, paler ones below; scutellum deep slaty-grey with similar golden scales to the mesonotum and deep brown border-bristles; the mesonotum shows some darker lines and some minute black specks; metanotum black.

Abdomen black with dark brown and black hairs.

Legs deep brown, the femora and tibiae spotted with yellowish-white, the first tarsal segment with three white bands, one apical, the mid first tarsal with the bands much smaller, the hind with six small spots; the first two tarsals of the fore legs broadly white banded apically, in the mid narrowly, in the hind legs the first

has a broad apical white band, the third is nearly all white (a minute black basal band), and the last two snowy-white entirely; ungues equal and simple.

Wings mostly dark-scaled, four small creamy costal spots (including the apical one), the first three spread evenly on to the first long vein, the fourth is longer on the first vein than on the costa; the third long vein has many pale scales, and there are some on the branches of the fourth and upper branch of the fifth, and a few pale scales on other veins, apices all pale, and there are very distinct pale spots on the fringe at the junction of all of them with it, rest of fringe very dark. First sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing.

Length.—6 mm.

Habitat.—Pretoria (Dr. Theiler).

Observations.—Described from two ♀ s. It is a most marked species, easily told by the large golden thoracic scales and densely scaled wings, which appear very dark.

PYRETOPHORUS COSTALIS. Loew (1866).

Anopheles costalis. Loew (1866).
Anopheles gambiae. Giles (1902).
Anopheles gracilis. Dönitz (1902).

Besch. ein Afrik. Dip. Nem., p. 55 (1866), Loew; Rept. Mal. Exp. Liv. Sch. Trop. Med., p. 49, Pl. V. (1900), Giles; Handbk. Gnats, 1st ed., p. 151 (1900), Giles; Archiv. de Parasitologie, IV., p. 573 (1901), Brumpt.; C. R. de la Soc. de Biol., LIII., p. 567 (1901), Laveran; Mono. Culicid. I., p. 157 (1901); III., p. 74 (1903), Theobald; Beit. 2. Kennt. d. Anoph., p. 76 (1902), *gracilis*, Dönitz; Handbk. Gnats, 2nd ed., p. 511 (1902), *gambiae*, Giles; Archiv. de Parasitologie V., p. 149 (1902), Brumpt.

Additional localities.—Kamuli, Gabula Country, Busago (Dr. Christy), Aug. 22; Sambwa in Bukedi Country and Bikira, Buddu (Dr. Christy); "British Central Africa" (F. O. Stoehr); Natal (Dr. Power).

Note.—There are three white palpal bands to *P. costalis*, the apical one is the largest. Besides the variations shown in Vol. I., some Uganda forms have the second costal spot spreading evenly on to the first long vein.

PYRETOPHORUS ARDENSIS. Theobald (1905).

Journ. Econ. Biol. Vol. I., No. 1, p. 17 (1905).

Head deep brown with grey scales; palpi in female brown with white apex and three other narrow white bands; proboscis brown. Thorax grey in the middle, dark brown laterally. Abdomen dark brown with golden hairs. Legs brown with femora, tibiae and first tarsals spotted, other tarsals with narrow apical pale bands, with yellow and deep brown scales, costa with six black spots, the two apical ones spreading evenly on to the first long vein, the third large having a large and small dark area beneath it, the fourth smaller, the two basal ones very small and only on the costa; fringe spotted.

♀. Head deep brown, clothed with a few white narrow-curved scales in the middle, numerous large white upright forked scales at the sides of them, and then upright black forked scales, two tufts of small white scales project forwards between the eyes, and some longer grey median scales between them. Palpi brown with deep brown scales, apex broadly white and with three other narrow white bands, one close to the broad apical fascia; proboscis deep brown, a little longer than the palpi. Antennae deep brown, basal lobe nude, second segment with a few grey scales. Thorax slaty grey in the middle, with a median dark line and traces of lateral dark lines on it, at the sides it is deep rich brown, clothed with long narrow-curved golden hairs and a tuft of white scales in front projecting over the head; at the sides of these appear dusky outstanding spatulate scales, which may be attached to the prothoracic lobes; scutellum slaty grey (ochreous in some lights) with a few long golden curved hairs and long brown posterior border-bristles; metanotum deep brown. Abdomen deep blackish-brown, shiny, with long golden-brown hairs.

Legs deep brown, banded and spotted with pale creamy white as follows:—A narrow apical band at the apex of the second and third fore tarsals, also at the apex of the first tarsal, which has also two broad and two narrow bands upon it, tibiae and femora with white spots, the last two tarsals are pure brown; in the mid legs the tarsals are the same, but the first tarsal is more spotted and the femora less so, having only five instead of six spots; in the hind legs the first tarsal has seven equi-distant and prominent spots, whilst the next three tarsals have the apex with a pale band, claws equal and simple; coxae pallid. Wings

with yellow and black scales; on the costa are six black areas, the apical one smaller than the second, the second than the third, the fourth about equal to the apical one in size; the two basal ones small, the first and second extend evenly on to the first long vein, the third is broken on the first long vein near the base (as in *P. costalis*), the fourth extends evenly on to the subcostal and first long vein, the two basal ones do not extend below, the branches of the second vein are dark scaled except at their apices and at the commencement of the fork, two dusky spots on the stem, one beneath the large costal spot (3rd). The third long vein has three black areas, one apical, a large and small one near the base; two black spots on each branch of the fourth, stem all black but for two small yellow spots; the fifth is all yellow except a black spot at the base and apex and three black spots on the upper branch; the sixth has three black spots; fringe brown, with a yellow spot where each vein joins the costa except the sixth. Halteres pallid with slightly fuscous knob with small grey scales.

Length, 5 to 5·5 mm.

♂. Palpi with the two apical segments swollen, of about equal size, clothed with white scales at their apices, brown elsewhere, the antepenultimate segment has also a small white apex and a small white spot on one side towards the base, two apical segments and apex of the antepenultimate with long golden-brown hair-tufts; antennae yellowish-grey, with deep brown verticillate hair, giving a banded appearance; legs and wings much as in the female, but one less spot on the hind metatarsi; fore ungues very unequal, the larger curved and uniserrate; mid apparently small and simple; hind small, equal and simple.

Length, 5·5 mm.

Habitat.—Natal (Dr. Power).

Observations.—Described from a perfect male and female. The ornamentation of the legs is very marked. The specimens were taken in Durban, where malaria was prevalent at the time, and the female had fed from a patient suffering from that disease (malignant tertian).

It will probably prove to be a malaria carrier in Natal with *P. costalis*, Loew.

PYRETOPHORUS ELEGANS. James (in Theobald) 1903.

Mysomyia ? elegans. James (1903).

Anopheles elegans. James (1903).

Anopheles leucosphyrus. James and Liston (1904) (non Dönitz).

Mono. Culicid. III., p. 51 (1903) (*Myzomyia ? elegans*); Handbk. Mosq. 2nd edit., p. 312, Giles (1902); Mono. Anop. Ind., p. 82 (1904), James and Liston (*leucosphyrus*); Revis. Anop., p. 33 (1904), Giles.

A few fresh perfect specimens of this species have been examined, which show it to belong to the genus *Pyretophorus*.

James and Liston assume it is the same as Dönitz' *leucosphyrus*.

It appears to come near it, but is quite distinct (vide figures of wings given in vol. iii., fig. 29 and fig. 30, p. 53).

Dönitz' *leucosphyrus* is not a dark mosquito, the thorax is bright chestnut-brown.

There is only one dark longitudinal line. James and Liston say "dark longitudinal *lines*."

The second long vein in *elegans* (*type*) has four black spots on each branch, and only four on the sixth long vein, but the number appears to vary, according to James and Liston, up to six.

The femora and tibiae are speckled with white, not yellow, as in *leucosphyrus* the mid legs are banded as the fore, whilst in *leucosphyrus* the mid legs are always unbanded. The hind legs have a broad pale tibio-tarsal band as in *leucosphyrus*, but the tarsal banding is apical and does not involve both sides of the joints as in that species.

The wing markings are very variable.

Characters of the larva.—Described by James and Liston; the following are the chief characters:—

It has simple unbranched frontal hairs and well developed palmate hairs on the first seven abdominal segments. The terminal filaments of the palmate hairs are rather short. They record the larvae as found by Dr. Coghill "in pools in the open while water was abundant, but as a rule in jungle springs, and it was particularly partial to water containing decaying leaves."

Habits.—The adults are never found in houses.

Genus **MYZORHYNCHELLA.** nov. gen.

Head clothed with rather long flattened outstanding scales, not closely appressed, but not so erect as upright forked scales, some more erect than others and narrower, but not forked and fimbriated as in most *Anophelinae*. Thorax and scutellum with broad curved scales.

Abdomen with hairs only. Wings with dense broad short lanceolate scales. Male palpi elbowed, partly tufted. Larger fore ungues biserrate. Closely allied to *Myzorhynchus*, but at once told by the peculiar head scales which do not occur in any other group of *Anophelinae*.

A single species only known.

Myzorhynchella nigra. n. sp.

♀. Head black with a median bare line, flat grey scales on each side with a dull blue shade, flat rather outstanding black ones on each side of the pale median area, becoming more upright at the back, and with some small outstanding narrow white ones in front, a few narrow-curved creamy scales between the eyes in front, and a tuft of long pale hairs projecting forwards. Antennae black with a few scales on the basal segments, and pale pubescence to the internodes; palpi black scaled with four narrow white bands, the two apical ones close together, the third closer to the second than the third is to the fourth; proboscis thin, black.

Thorax black with creamy-white spindle-shaped scales and dark chaetae, a tuft of longer pale scales on each side in front; scutellum with similar scales to mesonotum but narrower; metanotum black.

Abdomen black with dull golden hairs, no scales.

Legs with the femora, tibiae and to some extent the first tarsals with brown and pale scales; first tarsals and two following tarsals of fore legs with pronounced apical white bands; in the mid legs the femora are darker and have a pure white spot near the apex and the apical bands are much narrower; in the hind legs the femora have the white spot near the apex, are all dark as also the tibiae, the last three tarsals snowy white, also half the second and apex of the first; femora and tibiae of all the legs white beneath; apex of all the tibiae also white.

Wings dusky, scaled with dark scales and a few yellow patches;

three small prominent yellow spots on the costa and two small ones basally, the last at root of wing; first the largest and extends on to the first long vein, the second is the next largest and also extends on to the first long vein, the third only exists on the costa, also the small fourth and fifth basal ones; two small yellow spots on each side of the third costal spot on the first vein and another near its base; two on the lower branch of the first fork-cell and one at the base, two pale areas on its stem near the cross-vein; third long vein with four yellow spots, a small one at the base and apex; two small ones on the upper branch of the second fork-cell, one at the apex of lower branch and one at base of the cell; three spots on upper branch of fifth, one at the base of fork and half (basal) the lower branch yellow; three small yellow spots on the sixth.

First sub-marginal cell longer but no narrower than the second posterior cell, its base much nearer the base of the wing, its stem half the length of the cell; stem of the second posterior cell as long as the cell; supernumerary and mid cross-veins close together; posterior longer than the mid about its own length distant from it; fringe pale at the junction of each vein with the costa.

Halteres with dusky stem and black knob.

Length.—6 mm.

♂. Palpi elbowed, apical segments swollen, deep black, a narrow white band at the elbow joint, white scales on one side near the apex and at the apex, penultimate segment with a dense short tuft of brown hairs; antennae deep brown with pale internodes, deep brown hairs with pale grey reflections.

Thorax and legs as in the ♀, but the hind legs show less banding.

Wings with slightly different spotting, the third pale costal



Fig. 19.
Wing of *Myzorhynchella nigra.* ♀. n. sp.

spot is broken by a narrow black speck, and the base of the first and fourth veins are all creamy white, there are also many pale

scales on the third and the fringe has not any pale spots after the upper branch of the fifth. Fore ungues very unequal, the larger biserrate; mid and hind equal and simple. Claspers black, horny.

Length.—6 mm.

Habitat.—Brazil (Dr. Lutz); Mexico (Nat. Mus. Hung. M. Biro ?).

Observations.—Described from three ♀'s and a ♂. Dr. Lutz saw the specimens for a few minutes and said they were *Pyretophorus lutzii*, Cruz. They are certainly not a *Pyretophorus* and belong to the genus described here, characterised by the abnormal head scales.

It differs from *P. lutzii*, Cruz, in first of all being a very black Anopheline and not with a "fawn coloured" mesonotum as in that species; moreover, there are no "erect bifurcated scales" on the occiput, nor is the abdomen "fawn" coloured. In the ♂ also the larger ungues of the fore legs are bi- not uniserrated. A great part of Cruz's description of *P. lutzii*, however, agrees, and the two might easily be confused unless examined microscopically.

Genus **MYZORHYNCHUS.** Blanchard (nov. nom).

Rossia. Theobald. Journ. Trop. Med., Vol. II., p. 181 (1902).

Myzorhynchus. Blanchard. C. r. Soc. Biol., Vol. XXIII., p. 795 (1902).

Mono. Culicid. III., p. 84 (1903), Theobald; Genera Insect. Dipt., p. 9 (1905), Theobald; 2nd Revis. Anop., p. 37 (1904), Giles.

This genus seems well established, having been accepted by all the chief workers on *Anophelinae* and other *Culicines*. Only one new species has been described since vol. iii, namely *M. pseudobarbirostris*, Ludlow, and a new one is described here, *M. strachanii*.

The genus is very distinct but the species are very obscure in many cases.

All those at present known are wild insects and breed in swampy places, especially dark pools with much vegetation, and waters overgrown with green weeds. They are all vicious biters,

and several are probably connected with malaria. Malarial parasites can develop in them, and it is probable that malaria contracted in the open is accountable to them. *M. sinensis* (*jesoensis*) has been shown by Tsuzuki to carry the malarial parasites in Japan. So far none seem to occur in houses.

One species (*nigerrimus*) has been found an efficient host for *Filaria bancroftii*. All the larvae have much branched, almost brush-like frontal hairs.

Nothing further of note has been added to their life-history.

The genus is found in Asia, Africa, Australia, and Europe.

The known species number sixteen :—

1. *Myzorhynchus barbirostris*, Van der Wulp, Leyd. Mus. Notes 6, p. 48 (India, West Africa ?).
2. *M. bancroftii*, Giles, Handbk. Gnats (2nd ed.), p. 511 (1902) (Queensland).
3. *M. umbrosus*, Theobald, Mono. Culicid. Vol. III., p. 87 (1903) (Malaya).
4. *M. albotaeniatus*, Theobald, idem, Vol. III., p. 88 (1903) (Straits Settlements).
5. *M. sinensis*, Wiedemann, Ausseuro. Zweifl. Ins. p. 547 (1828) (China, Formosa).
6. *M. vanus*, Walker, Journ. Pro. Linn. Soc. Vol. V., p. 91 (1860) (Malaya, China).
7. *M. pseudopictus*, Grassi. Rend. dell. R. Accad. d. Lincei, p. 128 (1899) (Italy).
8. *M. minutus*, Theobald, Mono. Culicid. Vol. III., p. 91 (1903) (India, Punjaub).
9. *M. nigerrimus*, Giles, Hand-Book of Gnats, p. 161 (1900) (India).
10. *M. mauritianus*, Grandpré and Charmoy, Les Moustiques. Planters Gaz. Press (1900) (Mauritius, Central and Northern Africa).
11. *M. plumiger*, Dönitz, Ins. Börse. Jan. (1901) (Hong Kong, East India).
12. *M. paludis*, Theobald, Report. Mal. Com. Roy. Soc. p. 75 (1900) (West, Central and Northern Africa).
13. *M. pseudobarbirostris*, Ludlow, Journ. New York. Ent. Soc. (Sept. 1902) (Philippine Islands).
14. *M. coustani*, Laveran Arch. d. Parasit. Vol. VI., p. 309 (1902) (Madagascar).
15. *M. strachanii*. n. sp. (Sierra Leone).
16. *M. ziemani*. von Grunberg, Zoolog. Anz. XXV., p. 677 (1902) (Cameroons).

The species of Myzorhynchus tabulate as follows :

A. Palpi unbanded.
 a. Last hind tarsals brown.
 Legs with pale apical tarsal bands.
 β. One fringe spot.
 Legs not spotted *barbirostris*. Van der Wulp.

Legs with speckled femora and tibiae and more numerous "round ended" scales on the wing.. *pseudobarbirostris.* Ludlow.

ββ. Several fringe spots *bancroftii.* Giles.

βββ. No fringe spot.

One pale costal spot; wings with light and dark scales *umbrosus.* Theobald.

Two pale costal spots; wings mostly dark scaled *strachanii.* n. sp.

αα. Last hind tarsal white..... *albotaeniatus.* Theobald.

B. Palpi banded.

α. Last hind tarsal brown.

β. Wing fringe with one pale spot..... *sienensis.* Wiedemann.

ββ. Wing fringe unspotted.

γ. Palpi with four pale bands, apex white.

Wings with two yellow costal spots.

Wings distinctly spotted *vanus.* Walker.

Wings without prominent spots *pseudopictus.* Grassi.

Wings with two white costal spots *minutus.* Theobald.

γγ. Apex of palpi black..... *nigerrimus.* Giles.

αα. Last two hind tarsals white *mauritianus.* Grandpré.

ααα. Last three hind tarsals white *paludis.* Theobald.

Position and validity of *M. coustani*, Laveran, and *M. Ziemani*, Von Grunberg, doubtful, also *M. plumiger*, Dönitz.

Myzorhynchus barbirostris. Van der Wulp (1884).

Anopheles barbirostris. Van der Wulp (1884).

Leyden Museum, Notes VI., p. 46 (1884), Van der Wulp; Mono. Culicid. I., p. 146 (1901) and III., p. 86 (1903), Theobald; Handbk. Gnats, p. 146 (1900) and 2nd Ed., p. 308 (1902) and Revis. Anop., p. 39 (1904), Giles; Les Moustiq., p. 197 (1904), Blanchard; Insekten Borso XVIII., p. 37 (1901), Dönitz.

Additional localities.—Philippine Islands (Miss Ludlow. Caught in the woods, rarely in the quarters. Dr. Whitmore); European Hospital, Kuala Lumpur. xi. 02 (Dr. Durham); New Guinea (Biró) 1901; Annam (Dr. Vassal).

Notes. The palmate hairs figured by Capts. James and Liston (Plate V., Fig. 1, c.) do not agree with those figured by Christophers and Stephens, and reproduced on page 47, Vol. III., of this work.

The larvae of true *barbirostris* are found in dark pools of all depths, with and without vegetation. Liston and James say they are found in the lily ponds of the public gardens at Lahore, and that tanks overgrown with green weeds form favourite

breeding grounds. Malarial parasites can develop in this species but do so rarely in nature.

MYZORHYNCHUS PSEUDOBARBIROSTRIS. Ludlow (1902).

Journ. N. Y. Ent. Soc. X., p. 129, Sept. (1902); Class. Geo. Dist. and Sea Flight, Mosq. Phil. Isls., p. 11 (1903), Ludlow; Revis. Anop., p. 39 (1904), Giles.

Allied to *barbirostris*, Van der Wulp, but "round-ended" scales more numerous and wider, spread over wings, and the legs with speckled femora and tibiae, and all segments of legs white-tipped except last tarsal; palpi densely black-scaled, many of the scales with ochraceous tips.

Miss Ludlow's original description is appended:—

"♀. Head very dark brown with some pale scales on the top, spreading in front towards the sides and partly around the eyes, tuft in front white with a few dark hairs, otherwise covered with rather broad, not deeply forked scales with fimbriated tops, the tips grey; narrow median space bare. Antennae a lighter brown, minute white apical bands on the segments, first segment brown; verticels brown, pubescence white. Palpi very heavily scaled with dark brown (almost black) scales, many of which are ochraceous tipped, so that the effect is 'rusty,' segments obscure, but can be seen by breaks in the scales—as long as the proboscis; last segment with brown hairs. Proboscis also heavily dark scaled, same ochraceous tipped, tip a little lighter but still brown. Eyes dark brown with a narrow white rim part of the way round. Thorax dark brown with grey reflections and narrow-curved (almost hair-like) golden scales, arranged in faint (*i.e.* indefinite) lines, which in some lights seem to converge so as to form a 'V' from the cephalic edge, the whole length of the thorax, the point caudal; pleurae brown with white markings; scutellum brown at the centre, paler lateral, with slender golden curved scales (such as are on the thorax) and golden bristles; metanotum brown.

Abdomen dark brown, slight greyish reflections, golden hairs; on the ventral side are a few scattered white scales, and near the caudal end a bunch of rather long brown scales.

Legs, coxae, and trochanters all dark brown, white tipped; femora and tibiae all dark brown well sprinkled with white scales, the rest of the legs a little lighter brown and in some lights giving almost 'fawn-coloured' reflections; all the segments of the legs and feet are white wipped (? tipped), except the last tarsal segments, and on the mid legs they are a little lighter, giving almost 'clay-coloured' reflections; ungues simple and brown.

Wings dark with two small yellow spots on costa, one at the apex of the wing and extending on the apices of the first long vein and anterior fork of the second long vein, with light spots on the fringe at apices of

first long vein and anterior fork of second long vein, and an included dark spot at apex of marginal cell, giving the appearance of an incomplete ring; the other much smaller on the costa at junction of the sub-costa. The costal and basal portions of the wings dark scaled with a few *white* scales on the costa, sub-costa, first and second longitudinals, third longitudinal vein mostly white scaled, and on this appear a few round-ended scales with acuminate tips. The fourth longitudinal vein largely dark scaled, but the scales mostly of the roundish sort, which are either black or white; there are dark spots at the apices of each fork and light fringe at the apex of the anterior fork. The fifth longitudinal vein has almost exclusively the rounder scales and is mostly white, both as to stem and forks; dark spots at the apices of each fork, and the stem has a dark base, as have all the veins save the sixth, which is light scaled, except two heavy dark spots, one at the apex and one about the middle of the vein; the sixth has entirely round-ended scales in both black and white. Fringe dark except for the three small places indicated (*i.e.* at the apices of the first longitudinal vein, anterior fork of second, and anterior fork of fourth). Most of the veins even where light, have a sprinkling of dark among the median scales, but the larger part of the dark scales on these veins are lateral scales and lie close under the median scales, so that the wing looks much darker from the under (ventral) view, and in all the veins caudal of the third the lateral as well as the median scales are almost entirely of the 'round-ended' sort. The wing has, however, as a whole a dark rather than light appearance, probably due to the very heavy scaling of the first two or three veins, which are mostly dark scaled. The first sub-marginal cell is a little longer and narrower than the second posterior, the base of the former nearly on a line with the base of the latter, but not near the junction of the costa and sub-costa; the stem of the former is about two-thirds the length of the cell and shorter than that of the second posterior, which is longer than the cell; cross-veins are close together, the mid much the longest, meeting the supernumerary at nearly a right angle (apex towards apex of wing), and the posterior cross-vein is not half its length from the mid vein and stands at almost the same angle in the reverse direction. Halteres have black knobs, stem and base light.

Length.—5 mm.

Habitat.—Hagonoy, Bulacan, Luzon, Philippine Islands.

Time of capture.—October (2nd, 1901)."

Observations.—Miss Ludlow described this species, separating it on account of the many more "round-ended" scales on the wings than are seen in *barbirostris*. The specimen she sent me seems to be quite distinct, and also presents colour markings in legs and palpi, different to *barbirostris*. No pathological work has been done with this species.

MYZORHYNCHUS UMBROSUS. Theobald (1903).

Mono. Culicid. III., p. 87 (1903), Theobald; Revis. Anop., p. 39 (1904), Giles.

Additional locality.—The hospital, Kuala Lumpur, Federated Malay States (Dr. Durham), in February.

MYZORHYNCHUS STRACHANII. n. sp.

Allied to *M. umbrosus*, Theobald, but the wings are almost entirely dark scaled and there is no pale costal spot at the apex of the lower branch of the first fork-cell.

♀. Head slaty grey with ochreous upright forked scales in the middle, dusky grey ones at the sides, a few outstanding creamy broadish curved scales in front and passing down between the eyes, a row of short black hairs on each side passing forwards over the eyes, then four longer ones wide apart and a tuft of long brown ones with wavy outline passing between the eyes; antennae deep brown, basal segment deep testaceous brown with a few outstanding black scales which also occur on the second segment, hairs dark brown; palpi densely scaled with outstanding black scales, no trace of banding; proboscis black scaled.

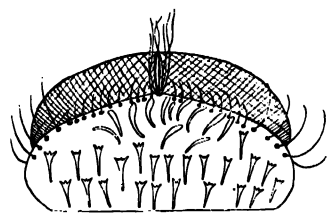


Fig. 20.
Head of ♀ *Myzorhynchus strachanii*. n. sp.

Thorax dark slaty brown with long golden curved hairs; in some lights pale slaty grey in the middle, dark brown at the sides with a narrow median dark line and rather broader lateral ones in front, numerous deep brown hairs also over the mesonotum; scutellum bright brown with brown and golden brown border bristles; metanotum deep brown; pleurae brown with frosty grey sheen.

Abdomen deep blackish brown with dusky hairs, showing slight golden reflections in some lights.

Legs deep brown, pale dull ochreous narrow bands involving both sides of the joints; unguis small, equal and simple.

Wings all black scaled except for a small yellow spot on the costa just past the base of the first fork-cell, one at the end of the first long vein including the fringe, a small one on the lower

branch of the first fork-cell, all the rest with dense blackish-brown scales; first sub-marginal cell longer and narrower than the second posterior cell, its base slightly nearer the base of the wing, its stem nearly as long as the cell; stem of the second posterior also nearly as long as the cell: the scales are darkest and densest at the costal region on the apical half, the region of the cross veins and in the middle of the sixth and on the lower branch of the fifth; fringe without any pale spot.

Halteres clothed with creamy scales, some dusky ones on one side of the knob.

Length.—5·8 mm.

Habitat.—Lagos (Dr. H. Strachan).

Time of capture.—November (1905).

Observations.—Described from a perfect ♀. It comes very close to *M. umbrosus*, Theobald, from Malaya, but can at once be separated by the dense dark scaled wings and the peculiar cephalic ornamentation. In the latter the front scales seem to be intermediate between upright forked scales and narrow curved ones, the line of chaetae bordering the eyes is also very characteristic.

MYZORHYNCHUS ALBOTAENIATUS. Theobald (1903).

Anopheles alboannulatus. James and Liston (1904).

Mono. Culicid. III., p. 88 (1903), Theobald; Mono. Ind. Anop., p. 81 (1904), James and Liston (*alboannulatus*); Revis. Anop., p. 39 (1904), Giles.

No new notes can be added on this species which has been referred to as *alboannulatus*.

MYZORHYNCHUS SINENSIS. Wiedemann (1828).

Anopheles sinensis. Wiedemann (1828).

Anopheles jesoensis. Tsuzuki (1902).

Ausseurop. Zweiflug. Insek., p. 547 (1828); Mono. Culicid. I., p. 137 (1901), and III., p. 89 (1903), Theobald; Centralblatt für Bakteriol, XXXI., p. 763 (1902) (=*jesoensis*), Tsuzuki; Handbk. Gnats, p. 160 (1900); 2nd ed., p. 305 (1902), Giles; Revis Anop., p. 38 (1904), Giles; Insekten Börse, XVIII., p. 37 (1901), Dönitz; Journ. Trop. Med. IV., p. 256 (1901), Young.

Tsuzuki described under the provisional name *jesoensis* this species from Japan, where it was studied in connection with malaria, which it was found to transmit.

Fresh specimens have been received from Mr. Cornford from the neighbourhood of Shaohyling, which show great variation in size and in the relative widths of the four pale palpal bands, especially the apical one. Other specimens have come from Japan.

MYZORHYNCHUS PSEUDOPICTUS. Grassi (1899).

Anopheles pseudopictus. Grassi (1899).

Anopheles pictus. Ficalbi (non Loew) (1896).

Atti. Accad. Lincei. Rend. VIII., 1, 102 (1899), Grassi; Mono. Culicid. I., p. 140 (1901), and III., p. 84 (1903), Theobald; Bull. Soc. Ent. Ital. XXVIII., p. 232 (1896), Ficalbi (*pictus*); Állattan. Közl. III., p. 30 (1904), Kertész.

Additional locality.—Hungary (Kertész).

MYZORHYNCHUS MINUTUS. Theobald (1903).

Anopheles nigerrimus. James and Liston (non Giles.)

Mono. Culicid. III., p. 91 (1903), Theobald; Mono. Anop. Ind., p. 79 (1900), James and Liston (referred to as *nigerrimus*); Revis. Anop., p. 38 (1904), Giles.

Giles' *nigerrimus* was his 16 *Anopheles* sp. "b," Calcutta (*vide* Handbk. Gnats, 1st Ed., p. 161). In his description he describes the apex of the palpi as *black*. This agreed with his original types and others seen.

The species I described as *minutus* has the tip of the palpi white, and is quite distinct.

Additional locality.—Kuala Lumpur (Dr. Durham).

Characters and habits of larvae.—The larval characters given by James and Liston (p. 81) refer to *minutus*, not *nigerrimus*. The median frontal hairs are unbranched, but *may be* bifurcate at their extremities. The external frontal hairs are very much branched, so that they form distinct "cocades" in front of the whorl organs.

The antennae possess a large branching hair on their inner side as in the larva of *barbirostris*. Palmate hairs are borne by the second to the fifth abdominal segments.

The larvae are usually found in deep shady pools containing grass and water weed, at some distance from habitations, and the adults are seldom met with in houses (James and Liston).

Economic importance.—The embryos of ***Filaria bancroftii*** can develop in this species.

MYZORHYNCHUS PALUDIS. Theobald (1900).

Repts. Malarial Com. Roy. Soc. Eng., p. 75 (1900); Mono. Culicid. I., p. 128 (1901), and III., p. 86 (1903); First Rept. Gord. Coll. Well. Labs., p. 70 (1904).

Additional localities.—This species has been taken in abundance by Colonel Penton on the Jur and at Meshra during the past year.

It is evidently common in the Bahr El Ghazal; Sambwa, Bukedi; Kisimbika, Uganda (Dr. Christy).

MYZORHYNCHUS MAURITIANUS. Grandpré (1900),

Anopheles mauritianus. Grandpré (1900).

Anopheles paludis, var. *similis.* Theobald (1901).

Anopheles tenebrosus. Dönitz (1902).

"Les Moustiques," Planter's Gazette Press, Port Louis (1900); Mono. Culicid. I., p. 129 (1901) var. *similis*, Theobald; Beit. z. Kennt. der Anop., p. 53 (1902) *tenebrosus*, Dönitz; Handbk. Mosq., 2nd ed., p. 296 (1902); Revis. Anop., p. 37 (1904), Giles.

Additional localities.—Bujaju, Buddu and Ankole (Dr. Christy); Natal (Dr. Power); Pretoria (C. B. Simpson); Cairo, Egypt (F. Willcocks) in June; British Central Africa (E. Stoehr); Madagascar (M. Ventrillon).

MYZORHYNCHUS ZIEMANI. Von Grünberg (1902).

Zool. Anziger. Bd. XXV. No. 677, July 21 (1902)
(= probably *M. mauritianus*, Grandpré).

"Head with erect black scales, frons with a large white tuft; palpi densely black scaled, except the apical segment, which is white, third segment with a basal, fourth with basal and apical pale rings. Thorax deep brown, with scattered paler bristles; on the fore half are median and lateral black lines, the latter duller, but more defined; a tuft of bristles arises from the prothorax on each side and projects over the occiput. Legs with clean brown femora, the last two hind tarsals and two-thirds of the third segment white, other tarsal joints minutely pale ringed.

Wings with dense dark scaled costa, with a single punctiform spot near the middle limited to it, an ill-defined one near the apex

extending to the anterior branch of the second vein; a few other spots on wing field.

Length.—5·5 mm. (body); 2·2 (palpi); 4·5 wings.

Habitat.—Wuri on the Cameroons."

Note.— Said by Dr. Zieman to be undoubtedly concerned in transmitting malaria.

This is probably nothing more than ***M. mauritianus***, Grandpré.

MYZORHYNCHUS COUSTANI. Laveran (1902).

Archives de Parasitologie, p. 359 (1902).

I have not seen this insect amongst those sent by Dr. Ventrillon from Madagascar. It resembles *M. mauritianus*, but is said by Laveran to have unbanded palpi.

Probably it will prove to be merely that species, which occurs in Madagascar.

Laveran also records it from Réunion.

GENUS **CHRISTYA.** Theobald.

Rep. Sleeping Sickness, Roy. Soc. 7, p. 34 (1903); Revis. Anop., p. 40 (1904) (= *Chrystya*), Giles; Les Moustiq., p. 625 (1904), Blanchard.

Head clothed with long upright forked scales and some short scales rather broadened in front; palpi densely scaled; thorax with hair-like curved scales and narrow-curved lateral ones; prothoracic lobes with narrow-curved scales; abdomen with hairs and dense lateral tufts of long hair-like scales, the tufts apical and also other long lateral hairs; wings with dense short lanceolate lateral vein-scales; fork-cells rather short. The ♀ only known.

A marked genus but closely allied to *Myzorhynchus*, from which it is easily separated, however, by the long lateral tufts of abdominal hair-like scales.

It was first found by Dr. Christy, who noticed its peculiarities and after whom the genus is named.

Christya implexa. Theobald (1903).

Proc. Roy. Soc. Vol. VII., p. 34 (1903), Theobald; Revis. Anop., p. 40 (1904), Giles; Les Moustiq., p. 625 (1904), Blanchard.

Thorax rich umber brown, with golden hair-like scales and a few narrow-curved ones laterally, a narrow cinereous line on

each side; pleurae deep brown with three diverging grey lines and some small white scales; head black, with golden upright forked scales and some short golden ones in front between the eyes; palpi densely scaled with brown and white bands. Abdomen black with pale brown hairs and with long dense lateral tufts of black and golden hairs. Legs deep brown, femora and tibiae and to some extent the first tarsal with milk white spots; the fore and mid tarsals with the first two segments with basal white bands and to some extent the other two; in the hind legs the apex of the first tarsal white, apical two-thirds of second tarsal and all remainder, except apex of legs, black. Wings with dense blackish-brown scales, costa with two very large yellow areas, one basal and two small ones near the apex, the smallest the second from the apex.

♀ Head black with long black upright forked scales behind, golden ones in front, and short golden ones between the eyes; palpi densely scaled with black and with bands of white scales and some yellow ones at the base; proboscis black; antennae banded black and testaceous, basal segment testaceous, the second with dense black scales.

Thorax rich dark chestnut-brown with curved hair-like golden scales, small flat pale creamy ones laterally and in front, a pale narrow grey line on each side of the mesonotum due partly to pale flat scales, partly to a grey sheen on the integument; prothoracic lobes deep testaceous with small flat narrow-curved creamy scales; scutellum deep brown with curved hair-like golden scales; metanotum deep brown; pleurae deep brown with some flat white scales and with frosty-grey lines, three prominent, radiating from a central point. Abdomen steely black with short pale brown hairs over the dorsum and with long black and golden lateral hairs, the black in prominent apical tufts; on the venter are several prominent silvery-white spots forming lateral lines. Fore-legs deep brown, femora and tibiae with white spots, a few only on the femora and one prominent pale band, the tibiae with six white spots, the first four tarsal segments with narrow white basal bands; mid legs as in the fore, but the femora with more white spots; hind legs with the spots still more numerous, the first tarsal much longer than the tibia, black with a narrow white apical band, apical two-thirds of the second tarsal white, remainder white except the apical part of the foot.

Wings with dense blunt lanceolate scales, mostly brown, but some forming yellow spots; costal border with a large yellow

apical spot which spreads on to the first long vein, next costal spot about the same size spreading on to the first long vein, but with a small median dark spot on the latter, next costal spot minute, not spreading on to the first long vein, apical spot larger and spreading evenly on to the first long vein; veins all dark scaled otherwise, except at the base of the fork-cells and at the posterior cross-vein and a small area at the base of the third vein; fork-cells short, the first sub-marginal longer and narrower than the second posterior, its base nearer the base of the wing, its stem about as long as the cell, stem of the second posterior longer than the cell; fringe black, a yellow spot at the junction of the upper branch of the fifth and the lower branch of the second posterior cell.

Length.—6 mm.

Time of capture.—June and August.

Habitat.—Togo, Jinja in Busago; Pokino, Toro; Bulema, Ankole; Kavirondo, all in Uganda.

Observations.—Described from a ♀ specimen taken by Dr. Christy in 1902. Others have been taken by Dr. Aubrey Hodges in 1903.

The species cannot be confused with any other species owing to its marked long lateral tufts of hair-like abdominal scales.

Genus **LOPHOSCELOMYIA.** Theobald.

Lophomyia. Giles (non Theobald).

'The Entomologist,' Vol. XXXVII., p. 12 (1904), Theobald; Journ. Trop. Med. VII., p. 366 (*Lophomyia*), Giles (1904); Gen. Ins. Fam. Culicid. p. 10 (1905), Theobald; Les Moust. p. 635, (1905) Blanchard.

Head with upright forked scales and some narrow-curved ones; palpi densely scaled in both sexes, most so in the male; thorax with very long curved hair-like scales. Prothoracic lobes large, with a tuft of black spatulate scales on the anterior face and with black bristles. Abdomen with hairs only, except the last two segments, which have lanceolate scales. Hind legs with a dense tuft of outstanding scales on the apex of the femora. Wings clothed with broadish blunt lanceolate scales.

This genus approaches *Nyssorhynchus*, Theobald, but differs in having long curved hair-like scales on the thorax instead of narrow-curved and spindle shaped ones.

The dense apical tufts on the femora are also very characteristic in both sexes.

No other *Anophelines* have yet been found approaching it, but others will probably be found in jungle growth.

Giles refers to this genus as *Lophomyia*, Theobald MS., December, 1904. It was described in January, 1904, as *Lophoscelomyia*. He probably examined the type in the British Museum collection without noticing whether it had been described. Blanchard merely quotes Giles.

LOPHOSCELOMYIA ASIATICA. Leicester (1904).

Lophomyia asiatica. Theobald MS. in Giles.

'The Entomologist,' Vol. XXXVII., p. 13 (1904) Leicester; Journ. Trop. Med. VII., p. 366 (1904) (Giles).

Wings with two yellow costal spots. Hind legs with the femora with a dense apical tuft of long black and white scales. Tarsi unbanded.

" ♀ Head black, frosted (when dry, dark brown); the scales are arranged in tufts and bare places are left between; it is rather lighter along the orbital margins, giving the appearance under the hand-lens of a narrow white margin to the eyes; on the vertex is a tuft of long silky hair-like scales, with a double curve on them which project well forwards; behind these are a few white narrow-curved scales on either side of a bare black line and extending but a small way back and laterally for a short distance down the orbital margins; behind these are some flat topped white upright scales which merge behind into a dense mass of black (when dry brown) upright scales extending laterally over the occiput to just short of the eyes, from which they are separated by a bare space. There are a few black narrow-curved scales succeeding the white along the orbital margin. The eyes are a metallic bronzy-green. Antennae with the basal segment dusky, its depression brown, some rather broadly spindle-shaped white scales on its inner face; the second segment light brown, some black spindle-shaped scales on its inner face, succeeding segments similar but without scales; all the segments except the basal one covered with short white hairs; verticillate hairs pale brown. Palpi equal in length to the proboscis; pallid, covered with long black scales, a few pale ones

at the junction of the third and fourth segments and some pallid hairs at the tip. Proboscis covered with short black scales; labellae fawn coloured.

Mesonotum with the greater part of the upper surface of a pale fawn colour (in some lights it has a greenish tinge) with a dark brown line in the centre in front; on either side there are two dark brown patches separated by a narrow pale line.

Looked at sideways these patches look lighter except for a small round dark spot at the upper part of the pale line separating the two patches. In front is a rosette of fairly broad curved scales, white in colour; the rest of the mesonotum is covered with scattered pale golden hair-like curved scales (white in some lights) and pale golden bristles. Prothoracic lobes elongated forwards but not mammillated; a tuft of black spatulate scales placed on their anterior superior face and there are also some black bristles.

Scutellum with the central part dark brown, black under a hand-lens; the lateral portions same colour as mesonotum; a few pallid curved hair-like scales are scattered irregularly over it, and the bristles are brown in colour. Metanotum the same colour as the mesothorax, with a dark brown central stripe.

Wings with the costa black scaled, except for two yellow scaled spots involving the first long vein and the second spot involves the upper branch of the second long vein. The first spot is placed rather more than half way from the base of the costa, the second just before the apex of the wing. There are two patches of black scales, one at the base of the second long vein and the other at the base of the third and at the base of the fourth. There is a light scaled area on the lower branch of the second long vein. The first submarginal cell longer and narrower than the second posterior cell, with its base nearer the base of the wing. All the rest of the veins clothed with black scales. Fringe black except opposite the yellow apical spot, where it is golden yellow.

Pleurae dark brown, marked with pallid lines.

Legs with coxae pallid; fore legs clothed with black spindle-shaped scales with a purplish hue in some lights; knee spot pale, and a few pale scales at the junction of tibia and first tarsal. Mid legs the same as the front, except for a conspicuous patch of white scales on the dorsum of the femora just before the apex. Hind legs have a little before the apex of the femora a dense tuft of lanceolate scales which stand out on either sides conspicuously;

where this ends the femora become snowy white, and similar long scales, snowy white in colour, project from either side. There is no tarsal banding. Fore and mid ungues equal and simple. Abdomen has the dorsum greenish yellow except segment four, which is dark brown; there are numerous pale golden hairs; on the last two segments there are numerous golden brown and dark brown lanceolate scales. The apices of the segments are slightly darker than the bases.

Length.—4·3 mm.

♂. Head muddy brown when fresh (dark brown when dry); between the eyes is a triangular space bordered on either margin by white narrow-curved scales and more to the front by long silky white hair-like scales, which cross and project forwards over the face; behind this space are a number of white spatulate scales standing upright like palisades; the ends are not forked; passing backwards toward the nape and also laterally is a dense tuft of upright scales which become darker and darker the further back they are placed.

Antennae with the basal segment dark brown, succeeding segments dirty white at the base, yellowish at the apex, plumes pale tawny brown.

Palpi long, black scales at the base on their outer sides; dark brown scales over the whole of the apparent first segment, except for a ring of pale scales about its middle; a ring of yellowish scales at the junction of the penultimate and antepenultimate segments; upper surface of the apical half of the penultimate segment scaled with yellowish scales and all the terminal segment except for a patch of black scales near its base. Proboscis uniform.

Thorax pale fawn-brown; a median dark line and lateral dark brown patches; on the anterior margin is a rosette of long narrow-curved white scales; hair-like golden bristles arranged in lines are distributed over it; there is a dark spot in front of the scutellum.

Wings with the costal spots much paler yellow than in the female; the first spot is very long and commences fully two-thirds from the base of the costa; the second spot is small and near the apex both involve the costa to first longitudinal, the second involving also the upper branch of the second long vein. At the base of the second long vein is a distinct patch of black scales, and a few are scattered along the course of this vein. There is another patch at the base of the third vein and another

near the base of the fourth and a very few along the course of the vein. Besides these and the scaling on the costa and subcostal and first long vein there are no other dark scales on the wing.

In the feathering of the hind legs and the markings of the legs generally it resembles the female.

Abdomen as in the female.

Length.—4 mm.

Habitat.—Ampang Jungle, six miles from Kuala Lumpur, Federated Malay States.

Time of capture.—June 27th."

Observations.—A very distinct small *Anopheline*, the hind femoral tufts easily distinguishing it.

Type in the British Museum (Nat. Hist.).

Genus **NYSSORHYNCHUS.** Blanchard. (nov. nom.)

Laverania. Theobald. Journ. Trop. Med., Vol. II., p. 181 (1902).

Nyssorhynchus. Blanchard. C. r. Soc. Biol., Vol. XXIII., p. 795 (1902).

Mono. Culicid. III. p. 92, (1903) Theobald; Gen. Ins. Fam. Culicid. p. 10 (1905) Theobald; Les Moust. p. 202 (1905) Blanchard.

Only two new species have been described in the genus since vol. iii. appeared, one by Miss Ludlow (*philippinensis*), another by myself (*nivipes*).

Thirteen species are known to date :—

1. *Nyssorhynchus maculatus*, Theobald, Mono. Culicid. Vol. I., p. 171 (1900) (India, Fed. Malay States).
2. *N. theobaldi*, Giles, Ent. Mo. Mag. p. 178 (1901) (India, Aden Hinterland).
3. *N. stephensi*, Liston (= *metaboles*, Theo.), Ind. Med. Gaz. Vol. XXXVI., p. 12, Dec. (1901) (India).
4. *N. fuliginosus*, Giles, Hand-Book of Gnats, p. 160 (1900) (India, Fed. Malay States).
5. *N. maculipalpis*, Giles, idem. (2nd ed.), p. 297 (1902) (India, Mauritius and Mashonaland).
6. *N. pretoriensis*, Theobald, Mono. Culicid. Vol. III., p. 99 (1903) (Pretoria, Natal).
7. *N. willmori*, James, idem, Vol. III., p. 100 (1903) (Kashmir, Malay).
8. *N. karwari*, James, ibidem, Vol. III., p. 102 (1903) (Karwar, Goa and Fed. Malay States).

9. *N. annulipes*, Walker, Ins. Saund. Vol. I., p. 433 (1850) (Australia).
10. *N. masteri*, Skuse, Proc. Linn. Soc. N. S. Wales, p. 1757 (1889) (Australia).
11. *N. nivipes*, Theobald, The Entomo., p. 258 (1903) (Fed. Malay States).
12. *N. jamesii*, Theobald, Mono. Culicid. Vol. I., p. 134 (1901) (South India and Ceylon).
13. *N. philippinensis*, Ludlow, Journ. N. York. Ent. Soc. X. p. 128 (1902) (Philippine Islands).

The species tabulate as follows:—

A. Last hind tarsals brown.
 a. Legs spotted.
 β. Apical pale bands to legs.
 Proboscis dark *stephensi*. Liston.
 Proboscis pale on apical half *masteri*. Skuse.
 ββ. Apical and basal pale banding *annulipes*. Walker.
B. Last hind tarsal white.
 a. Legs spotted with white.
 Palpi 3 white bands *willmori*. James.
 Palpi 4 white bands *maculatus*. Theobald.
 aa. Legs not spotted, 4 palpal bands *karwari*. James.
C. Last two hind tarsals white.
 Legs with mottled femora, tibiae and metatarsi, 3 white palpal bands.
 Two apical palpal bands close together ... *theobaldi*. Giles.
 Two apical palpal bands far apart..... *pretoriensis*. Theobald.
D. Last three hind tarsals white.
 a. Palpi with three white bands.
 Palpi spotted, legs spotted *maculipalpis*. Giles.*
 Legs spotted, not palpi *jamesii*. Theobald.
 Palpi and legs not spotted.
 Wings with 4 white costal spots *fuliginosus*. Giles.
 Wings with 5 white costal spots *nivipes*. Theobald.
 aa. Palpi with 4 white bands *philippinensis*. Ludlow

NYSSORHYNCHUS STEPHENSI. Liston (1901).

Not *Anopheles metaboles*. Theobald (1902).

Ind. Med. Gaz. XXXVI., No. 12 (Dec. 1901), Liston; Mono. Culicid. III., p. 93 (1903), Theobald.

Additional localities.— Calcutta; Madras; Nagpur; Ellichpur, in the Berars, and Mian Mir, Punjab (Capts. James and Liston, I.M.S.).

* Traces of pale scales between mid and basal pale palpal bands.

NYSSORHYNCHUS ANNULIPES. Walker (1850).

Anopheles annulipes. Walker (1850).

Anopheles musivus. Skuse (1888).

Anopheles musicus. Giles (1902).

Ins. Saund. I. p. 433 (1850), Walker; Proc. Linn. Soc. N. S. Wales, p. 1754 (1889), Skuse; Handbk. Gnats, 2nd Ed. p. 313 (1902) Giles. Mono. Culicid. I., p. 164 (1903) and III., p. 104 (1903), Theobald; Revis. Anop., p. 44 (1904), Giles.

This *Anopheline* oviposits singly as in all of this group.

Dr. Bancroft has recently sent specimens from St. George, S. W. Queensland.

NYSSORHYNCHUS WILLMORI. James (in Theobald) (1903).

Anopheles willmori. James (1903).

N. willmorei. James (Blanchard) (1905).

Mono. Culicid. III., p. 100 (1903), Theobald; Revis. Anop., p. 42 (1904), Giles; Les Moust. p. 624 (1905), Blanchard.

Additional locality.—Pundalnoya, Ceylon (E. E. Green).

Mr. E. E. Green sends me specimens of this species from Ceylon and calls it the "Instep-biting mosquito." Taken in July.

NYSSORHYNCHUS MACULATUS. Theobald (1901).

Anopheles maculatus. Theobald (1901).

Mono. Culicid. I., p. 171 (1901); III., p. 96 (1903), Theobald; Handbk. Mosq., 2nd ed., p. 301 (1902), Giles; Les Moust., p. 207 (1904), Blanchard; Mono. Anop. Ind., p. 99 (1904), James and Liston; Revis. Anop., p. 42 (1904), Giles.

This species is the type of the genus.

"*Larva.*—Frontal hairs, simple and unbranched. Palmate hairs are borne by the second to seventh abdominal segments; the terminal filament of each leaflet is very short." (?) (James and Liston).

Additional localities, given by James and Liston.—Lahore, in March and April; in the Bengal Duars in August to September; and at Kurseong at an elevation of 5000 feet.

NYSSORHYNCHUS KARWARI. James-Theobald (1901).

Anopheles karwari. James and Liston.

Mono. Culicid. III., p. 102 (1901), Theobald; Revis. Anoph., p. 42 (1904), Giles.

Additional locality.—Kuala Lumpur (Dr. Durham). Taken April 27, 1902.

Larva.—The larva has four simple frontal hairs.

NYSSORHYNCHUS THEOBALDI. Giles (1901).

Anopheles theobaldi. Giles (1901).

Ento. Mo. Mag., p. 198 (1901), Giles; Mono. Culicid. II., p. 311 (1901), Theobald; Ind. Med. Gaz. (Dec. 1901), Liston; Handbk. Gnats, 2nd ed., p. 299 (1902), Giles; Mono. Culicid. III., p. 95 (1903), Theobald; Revis. Anoph., p. 43 (1903), Giles; Mono. Anoph. Ind., p. 97 (1904), James and Liston.

Little or nothing new has to be recorded concerning this species.

The adult *N. theobaldi* has been proved under experimental conditions to be capable of harbouring human malarial parasites.

NYSSORHYNCHUS INDIENSIS. Theobald.

N. maculipalpis. Giles. var. *indiensis.* Theobald (1903).

Anopheles maculipalpis. James and Liston (non Giles) (1904).

Mono. Culicid. III., p. 99 (1903), Theobald; Mono. Anoph. Ind., p. 95 (1904), James and Liston.

The Indian specimens received from Dr. Christophers, which were referred to (iii., p. 99) as a variety of the African *maculipalpis*, are now seen to be distinct, as one would expect.

Localities.—Central Provinces, Nagpur, Travancore, Goa, etc., and at Karwar, Bombay Presidency.

Capts. James and Liston, I.M.S., say it occurs in small numbers in the Central Provinces, and more commonly in parts of southern India.

The Larva.—The same observers state that there is a prominent pair of palmate hairs on the thorax in addition to

those on the abdominal segments. They figure the larva (Plate IV.).

NYSSORHYNCHUS FULIGINOSUS. Giles (1900).

Anopheles fuliginosus. Giles (1900).

Anopheles jamesii. Liston (non Theobald) (1901).

Anopheles leucopus. Dönitz (1901).

Gnats, p. 160 (1900), 1st ed., Giles; Mono. Culicid. I., p. 122 and II., p. 307 (1901), Theobald; Ind. Med. Gaz., p. 441 (1901), Liston; Insk. Börse, XVIII., p. 37, 4 (1901), Dönitz; Proc. Roy. Soc. Eng. LXIX., p. 370 (1902), Theobald; Beit. z. Kenntn. d. Anop., p. 73 (1902), Dönitz; Ind. Med. Gaz. XL., Jan. (1903), Adie; Mono. Culicid. III., p. 93 (1903), Theobald; Bombay N. H. Soc. Journ. XV. 2, p. 265 (1903), Manders; Spolia Zeylandica, II., VIII., p. 169 (1905), Chalmers; Ind. Med. Gaz. XXXVIII., July (1905), Adie.

Variety.—A specimen sent from Chingelput, S. India, shows the following variations from the type: the black on the base of the first long vein spreads underneath both basal white spots, whilst it is white at the base; the pale areas on the fifth are much larger, and the apical black spot of the sixth is very long, the two basal ones small. The dark lines of the thorax are very pronounced, and also the white thoracic scales.

The specimen was taken in March, I fancy by Captain James, I.M.S.

The variation in this species is somewhat marked. Major Adie, I.M.S., writing to me, states that it shows marked seasonal variation. He has shown that at the end of the autumn the typical form is replaced by one with four white palpal bands and two white hind tarsi, and that in the spring it returns to the typical form. The form with four pale palpal bands and two white hind tarsi occurs in the Punjab all the winter (*vide* Indian Med. Gaz., xxxviii., July 7, 1903, and 4 Jan., 1905, Adie).

The typical *fuliginosus* flourishes from the middle of March to the beginning of January, the variety from about the middle of November to the end of April.

This species is found in frequent company with *M. culicifacies*, Giles. Major Adie asks an interesting question in his valuable paper. "It would be interesting to know why a *fuliginosus* is better able to get through the winter with four white palpal bands and two white hind tarsi than with the ordinary three white bands and three white hind tarsi. Is it that in their

winter retreats, in those dark, tortuous mud-cracks spoken of, four bands would be more useful for recognition, and white dangling tarsi of no account?"

Giles, in the second edition of his handbook, refers my variety *pallida* to a distinct species. It is not so, however.

Additional localities.—Philippine Islands (Miss Ludlow); Ceylon (E. E. Green, Major Manders, R.A.M.C., A. J. Chalmers); Bombay, Goa, Madras along the east coast, the plains of Bengal, in Kurseong at 5000 feet elevation, Ferozepore district (Major Adie), very common; Deesa, India (Major C. G. Nurse), and in April, in Ellichpur.

Notes on Life-history and Habits.

This species occurs both indoors and out. In India Adie notes that it is the only species which lasts throughout the year. He found adults in native dwelling-houses, empty houses, cow-sheds, and outhouses in all localities. They like *sirki* roofs and do not object to cobwebs, flying about in rooms thick with the latter and settling on them. They do not fly far when disturbed.

This is a widespread India species, and is equally common in the Philippines. In some districts it is frequent in houses, but does not enter them in others.

The larvae are found in tanks and natural collections of water, especially with weed and grass growing into it. In India Major Adie, I.M.S., says the larvae flourish in the canal at Ferozepore amongst the weeds all through the year, but that in cold weather they cannot be found.

The larvae are found in large natural ponds with grass and weeds at the edges, and in the Punjab the larvae occur along with those of *nigerrimus* and *barbirostris* in shady, weed-grown pools under trees. In Bombay it occurs in tanks.

The life-history has been well worked out by Major Manders, R.A.M.C. In colour the larva varies from pale to dark olive green, with two pale (white) circular markings anteriorly on either side of the dorsal line; the penultimate segment may be greenish-red, head pale mottled brown with darker brown. Length 5 mm. The frontal hairs are slightly variable; the median pair have small branches, the lateral ones much branched; the antennae have no lateral branched hairs, and there are six pairs of palmate organs, each organ composed of seventeen plates which are acuminate.

Dr. A. Chalmers notes that there are rudimentary palmate hairs on the first abdominal segment (and more rarely a very rudimentary one on the thorax), at times well developed from second to seventh inclusive.

The pupa is 5 mm. long, pale green to light brown, changing to dark brown. When nearing maturity the siphons are white, also anal fins, which bear a long terminal curling seta.

The pupal stage lasts just twenty-four hours in Ceylon (Major Manders, R.A.M.C.).

This observer noticed that they invariably hatched out between 7 P.M. and midnight, usually between 7 and 8 P.M.

Economic Importance.

Capt. James, I.M.S., has found that quartian, tertian, and tertian malignant parasites will develop in this species artificially, but it had not been found infected under natural conditions (Sc. Mems. Ind. (N. S.), No. 2, p. 39, James). Major Adie has, however, found the sporozoits in wild *fuliginosus* (Ind. Med. Gaz., xxxviii., July 7, 1903).

NYSSORHYNCHUS NIVIPES. Theobald (1903).

The Entomologist, Vol. XXXVI., p. 258 (1903); Revis. Anop., p. 43 (1904), Giles.

Thorax black, with snowy-white, spindle-shaped scales; pleurae mottled with dark and light brown; abdomen black, hairy, with pale scales on the last two segments and genitalia. Wings with three large and three small basal costal spots, the third black spot the largest, with three small spots beneath; most of the veins pale scaled, the fourth dark up to the fork. Legs deep brown, the fore and the mid with apical pale bands, the hind legs with the last three tarsals white and also the apex of the preceding one.

♂. Head deep brown, with a tuft of snowy-white, upright, forked scales and a slight pale border around the edges, two snowy-white bristles projecting forwards and some brown ones laterally; antennae brown, with some flaxen and white plume-hairs; basal segments with brown and white scales; palpi brown, clavate, two white ventral patches on the apical swollen part and some white scales ventrally on the remainder, and a few brown lateral hairs on the last two segments. Proboscis thin and black.

Thorax black to blackish-brown, with scattered snowy-white, spindle-shaped scales and some brown ones projecting forwards between the thorax and nape; prothoracic lobes brown, with white scales. Scutellum with spindle-shaped white scales. Pleurae dark and paler brown, slightly mottled, and with scattered white scales.

Abdomen black with brown hairs, the last three segments with narrow white scales, especially on the apical borders; genitalia densely scaled with small, flat, and narrow-curved white scales.

Wings ornamented much as in *N. stephensi*, but the fourth black spot on the first long vein extends backwards past the small white costal spot. There are also more dark scales on the branches of the first sub-marginal cell, and three (not two) spots on the upper branch of the fifth vein.

Legs brown, the fore pair with apical pale bands to the first three tarsal segments, and a white apical spot to the tibiae; ungues unequal, the larger biserrated; mid legs with a pale apical band to the first tarsal only, and a trace of a pale tibial spot, ungues *apparently* equal, both uniserrated; hind legs with the last three segments white; also the apical half of the second tarsal, apex of first and tibiae also white, ungues small, equal and simple.

Length.—3·5 mm.

Habitat.—Kuala Lumpur.

Time of capture.—January.

Observations.—Described from three ♂'s. This species comes very near *Nyssorhynchus stephensi*, the wing ornamentation being almost the same. The thoracic scales, however, are spindle-shaped, not narrow-curved, and the legs are not speckled. Nor are the hind legs of *N. stephensi* white at their apex as in this species.

It also comes near *N. maculatus*, Theobald, but differs from this species in (1) the mid ungues of the male not being simple, and in (2) the greater number of white hind tarsal segments.

Giles, in his "Revision of the *Anophelinae*," p. 43 (1904), refers to this under a MS. name. It was described in the preceding year.

NYSSORHYNCHUS PHILIPPINENSIS. Ludlow (1902).

Anopheles philippinensis. Ludlow (1902).

Pyretophorus philippinensis. Ludlow-Giles (1904).

Journ. N. Y. Ent. Soc. Vol. X., p. 128 (1902); Class. Geo. Dist. Seas. Flight Mosq. Phil. Isls., p. 15 (1903) Ludlow; Revis. Anoph., p. 43 (1904), Giles; Journ. Trop. Med. VII., p. 365, Giles.

Apparently very close to *N. nivipes*, Theobald, differing only in having non-spotted femora and tibiae as far as can be judged from the description appended.

" ♀. Head very dark brown, with white and creamy scales scattered on top, and more thickly toward the front, long tuft in front, a few yellowish scales on the sides, and very dark forked scales with fimbriated tops on the occiput, antennae golden brown, some white scales and some brown at the base with lighter tips, verticels white, pubescence white, first segment basally brown but white at apex; eyes dark brown or black with very narrow white rim; palpi golden brown, some scales apparently darker tipped, the last segment white and a narrow white band at apex of each of the three preceding segments, a few white scales at the base; proboscis brown, not so dark on the head but darker than the antennae, white or yellowish tip. Thorax very dark brown with scattered white flat and yellowish curved scales, no design apparent,—cephalad the white scales are much longer; scutellum dark brown in the middle and at each end with a lighter spot between, on which are a few white scales; metanotum dark brown; pleurae dark brown with white markings; when denuded, thorax has ashy grey reflections with dark brown median and sub-median lines.

Abdomen dorsally ashy grey, with golden brown hairs, a narrow brown apical band on each segment, much broader on the last two segments so that they are nearly brown instead of grey.

Legs; coxae brown, all white tipped, femora dark—*i.e.* brown scaled dorsally and yellowish on ventral side, tibiae same but a very small apical white spot on fore and mid legs; first tarsal and two following segments on the fore legs have heavy apical white bands, mid legs have faint light bands in same positions, that on the first tarsal much the heaviest, but still not by any means so broad as on the fore legs; hind legs dorsally brown, yellowish ventrally much as in the other legs, but the apical half of the second tarsal and all the following segments pure white. Ungues of hind legs light (white), those on mid and fore legs brown.

Wings cream coloured, spotted with brown, reminding one of *A. jamesii*, Theob. Two small and four large brown spots on costa, the distal extending back through anterior fork of second long vein, the next, somewhat larger, through first long vein, the third and largest of all extends as a long spot on the costa and sub-costa, and three small ones on the first long vein, so arranged as to resemble an overturned E (ⅎ),

the middle of these small spots is the largest and connects with one on the second long vein; the fourth spot, counting from the apex of the wing includes the sub-costa and first long vein and even the two small ones include the sub-costa, making all these costal spots very distinct. The apex of costa is, however, light. There are two dark spots on anterior fork of second long vein and one on the posterior fork; two small spots at the bases of the third long vein, one on the anterior fork of the fourth; a small one near apex of posterior fork, and the stem is dark to posterior cross-vein and after a small white spot, about one-half the way to the base of the vein; anterior fork of the fifth has three dark spots and there is one near apex on the posterior, also on the stem of the fifth near base of wing; there are three dark spots on the sixth, one at apex, one near middle and one near the base. A large part of the second and fourth are therefore dark, while the fifth has a large part cream coloured, and a still larger proportion of the third is light. Fringe mottled cream and brown, nearly equally to the sixth long vein, after which it is dark. Dark spots occur in the fringe at the apex of the anterior fork of the second long vein and at the apices of the first posterior, second and third posterior, anal auxiliary and spurious cells with light spots at the apices of each intervening vein. The first sub-marginal cell a little longer than the second posterior, the base of the former being a little nearer the base of the wing. The posterior cross-vein about one and a half times its length nearer the base of the wing than the mid cross-vein, and the supernumerary about its length nearer the apex than the latter.

Length.—5 mm. (including proboscis).

Habitat.—San Jose, Abra, Luzon, Philippine Islands.

Time of Capture.—September (1. 01)."

Note.—With the exception of the non-spotted legs, this insect seems to me to resemble *N. nivipes*, Theobald, and I expect it may prove to be a variety of that species. Giles refers to it as a *Pyretophorus* (J. T. Med. vii., p. 265). It is a distinct *Nyssorhynchus* as Miss Ludlow states.

Genus **CELLIA.** Theobald.

Mono. Culicid. III., p. 107 (1903); Revis. Anop., p. 45 (1904), Giles; Les Moust., p. 214 (1904), Blanchard; Genera Insect. Fam. Culicid., p. 11 (1905), Theobald.

Six species have been described previous to the appearance of this volume in the genus *Cellia.*

Three of the known eight species have proved efficient hosts

for the malarial parasites, viz. *Cellia pharoensis*, Theobald, *Cellia argyrotarsis*, Desvoidy, and *Cellia albimana*, Wiedemann.

It is one of the most marked genera of this section, the dense scaling and lateral tufts being marked in all the eight species.

The life-history of three is well known, namely, *pulcherrima*, *argyrotarsis* and *albimana* (*albipes*).

That of *pulcherrima* has been worked out by Liston and James, *albimana* by Dr. Grabham, *argyrotarsis* by Goeld and Lutz.

The adults as seen in *C. pharoensis* and *C. pulcherrima* are found in houses, barracks and native huts.

The genus occurs in Asia, Africa, South America, and the West Indies. The following species are known:—

1. *C. pharoensis*, Theobald, Mono. Culicid. I., p. 169 (1901) (Africa, West, East, Central and Northern).
2. *C. pulcherrima*, Theobald, Proc. Roy. Soc. Lond. LXIX., p. 369 (1902) (India).
3. *C. squamosa*, Theobald, Mono. Culicid. I., p. 167 (1901) (Africa generally).
4. *C. kochii*, Dönitz, Ins. Börse, V., p. 18 (Jan. 31, 1901) (Federated Malay States, Sumatra, Java, Philippine Islands).
5. *C. argyrotarsis*, Robineau-Desvoidy; Essai sur les Culicid. p. 411 (1827) (West Indies and South America and South of North America).
6. *C. albimanus*, Wiedemann, Mono. Culicid. I., p. 125 (1901) (West Indies, British Guiana, Brazil).
7. *C. bigotii*, Theobald, Mono. Culicid. I., p. 135 (1901) (Chili).
8. *C. punctulata*, Dönitz, Insecten Borse. p. 372 (1901) (New Guinea).

SYNOPTIC TABLE OF CELLIA.

A. Legs with last three hind tarsals white.
 Dark species..... *argyrotarsis.* R. Desvoidy.
 Yellowish species *pulcherrima.* Theobald.
B. Legs with last hind tarsal white.
 Femora and tibiae mottled; apical foot bands..... *pharoensis.* Theobald.
 Femora and tibiae not mottled *bigotii.* Theobald.
C. Legs with last hind tarsal white except base, 2nd and 3rd white *albimana.* Wiedemann.
D. Legs with last hind tarsal dark.
 Dark species; 3 white long lateral thoracic lines..... *squamosa.* Theobald.
 Pale species; thorax with two ocelli; pleurae pale with large black spots ... *kochii.* Dönitz.

CELLIA PHAROENSIS. Theobald (1901).

Anopheles pharoensis. Theobald (1901).

Mono. Culicid. I., p. 169 (1901) and III., p. 109 (1903); Handbk. Gnats, 2nd ed., p. 302 (1902); Revis. Anop., p. 45 (1904), Giles; Journ. Hyg. II., p. 49 and 55 (1902); Les Moust., p. 214 (1904), Blanchard.

Additional localities.—Kafr el Dawar, Egypt (F. Willcocks) in June; British Central Africa (F. O. Stoehr); Wadelai, Nile Provinces; Sircaos, four marches from Wadelai on the banks of the Nile (Dr. Christy); Rosaires on the Blue Nile (Dr. Balfour); along Suez Canal, Ismailia (Dr. Roos); Madagascar (M. Ventrillon).

Note.—Dr. Christy states in a letter that this *Cellia* "adopts *Anopheline* attitude when at rest, and that the tent-roof used to be covered with them in the morning, none seen in the evening."

CELLIA ALBIMANA. Wiedemann (1821).*

Cellia cubensis. Agramonte (1900).

Anopheles cubensis. Agramonte (1900).

Anopheles albipes. sub-sp. Theobald (1901).

Cellia albipes. Theobald (1903).

Anopheles tarsimaculatus. Goeldi (1905).

Dipt. Exot. I., p. 10 (1821), Wiedemann; El progresso Medico, X., p. 460 (1900), Agramonte; Mono. Culicid. I., p. 125 (1901), and III., p. 110 (1903); Mosquitoes of Jamaica, p. 15 (1905); Handbk. Mosq., 2nd ed., p. 300 (1902), Giles; Revis. Anop., p. 46 (1904), Giles; Les Moust., p. 204 (1905), Blanchard.; Os Mosq. n. Para, p. 133 (1905), Goeldi.

Additional localities.—Potaro Road, British Guiana (W. J. Kaye), in May; in Jamaica it is very common at the Ferry and Rockfort Swamps, and over the Lignanea Plain. Dr. Grabham also records it from Bath, Bowden, Annotto Bay, Port Antonio, Bluefields, Castleton, and Spaldings. Runaway Bay in April (Lord Walsingham).

Specimens collected by Lord Walsingham had very prominent thoracic ocelli and a black spot on part of the scutellum.

Life-history and habits.—Breeding grounds very variable, such as rivers, large swamps, small swamps, irrigated cane-fields, ditches, trenches, canals, small water-ways and water-holes and

* Blanchard (p. 202) takes Wiedemann's *albimanus* to be Robineau Desvoidy's *argyrotarsis*. I think there is no doubt, however, that Coquillett is right and that *albimanus* is my *albipes*.

depressions made by the feet of cattle. Not only in fresh water, but also in salt water, for Dr. Low records it in a lagoon of water shut off from the sea by a bank of sand only ten yards wide, with no vegetation except some old seaweed—in fact, almost any natural collection of water may contain them. So far, none have been found in tubs, barrels, or any other artificial collection. The figures given in the monograph of the larval characters (p. 111, fig. 65) are *not* of this species, but probably of *C. argyrotarsis* sent with them, both larvae now and again occurring in the same pool. The descriptions given here of the egg, larva and pupa are drawn up by Dr. Grabham, who has followed them closely in development.

The Egg.—Eggs laid in batches of fifty to eighty arranged together side by side or in stellate groups on the surface of the water. Length, 0·4 mm., breadth, 0·2 mm., across the widest points of the floats. Upper surface dumb-bell-shaped. Fringe represented by a thickened ridge without striation. Floats of relatively large size, attachment to seven-eighths length of fringe. On the under surface the floats nearly meet. Lower surface with irregular polygonal markings.

The larva.—Head with distinctive markings as in the figure. Brushes when extended reach as far as the extremities of the antennae. Four simple hairs project over mouth, of nearly equal

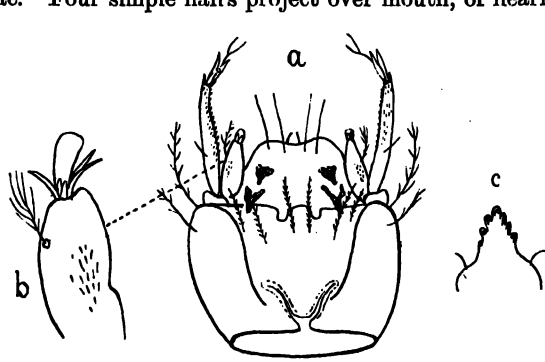


Fig. 21.
Cellia albimana. Wiedemann.
a Larval head; b palp; c labial plate.

length, outer pair slightly longer. A pair of small curved hairs on the edge of clypeus near the median line. Four plumose hairs arranged across the centre of the head. Two smaller additional ones placed externally and more anteriorly. From the antero-

lateral angles of the head a pair of plumose hairs spring on each side, the largest reaching to the distal third of the basal segment of the antennae. Antennae: basal segment, upper two-thirds spiny—along the inner border especially. A simple short spine arises on the outer surface at the junction of the mid and lower thirds. Surmounting the basal segment are two lanceolate laminae and a filamentous bifurcated hair, each lamina one-third length of basal segment. Maxillary palp half length of antennal basal segment; on the outer surface a short plumose hair, and on the upper surface a number of small stout spines. The palp is terminated by a wedge-shaped lamella and five spines; two of these are much shorter than the other three. Mandible: four to six simple stout curved bristles forming a group at the outer angle with a number of smaller ones. The concave borders of some of the bristles are finely serrated. One large notched tooth followed on a lower plane by a series of denticles. A row of very slender simple hairs arises from the median border of the mandible. Lower lip of Meinert: pyramidal, consisting of seven to eight highly chitinous rounded teeth. Thorax: several long plumose hairs, each supported by a pedicel, spring from the angles; on each pedicel there is also a short curved lateral spine; sometimes only the spine is present. These spines are not present on the abdominal pedicels. The anterior border is ornamented by a band of white pigment; a V-shaped conspicuous mass of pigment is generally present on the upper central surface; this is absent in some specimens. Abdomen: a pair of plumose hairs on the lateral borders of each of the first three segments. The following segments have only simple and small branched hairs. A pair of palmate hairs on each segment from the second to seventh inclusive. A pair of rudimentary palmate hairs on the first segment. Leaflets 12–16. Each leaflet simple, narrowly lanceolate, not shouldered. Anal papillae: equal, ovate, one-third length of longest posterior bristles. Semilunar pigmented markings are usually found on the second and fifth

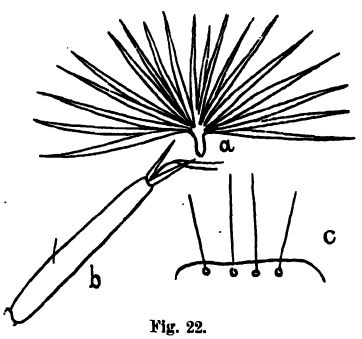


Fig. 22.
Cellia albimana. Wiedemann.
a Palmate hairs; b antenna; c frontal hairs.

abdominal segments. These may be only faintly represented or absent altogether. Occasionally a median dorsal band of brilliant white pigment extends from the respiratory stigmata to the thorax. Colour of adult larvae is usually bright green; sometimes dull olive green or orange grey.

The pupa.—A pair of large branching hairs spring from the posterior of the first abdominal segment; a pair of smaller branched hairs on the third and fourth segments. The second segment without these hairs.

According to Dr. Low, the larval stage lasts from fifteen to eighteen days and the pupal stage two days.

Synonomy.—This species was described in a Mexican medical publication a year before the issue of the first volume of this work under the specific name *cubensis*, by Agramonte; the name *albipes* also by which it is generally known must sink, as Coquillett has shown it to be the *albimanus* of Wiedemann.

Economic importance.—The adults bite by night and day. Dr. Low describes how great numbers came and bit him about midday when sitting under a mango tree in British Guiana. Dr. St. George Gray also wrote me that "when disturbed it will bite at any time of the day or night."

Not only does this species bite somewhat severely, but it acts as the intermediate host for the parasite of malignant malaria, and also for the development of *Filaria nocturna*. On the other hand, it is inefficient for *Filaria demarquaii*.

CELLIA PUNCTULATA. Dönitz (1901).

Anopheles punctulatus. Dönitz.

Myzomyia punctulata. Dönitz.

Insecten-Börse, XVIII., p. 372 (1901); Handbk. Gnats, 2nd ed., p. 287 (1902), Giles; Revis. Anop., p. 33 (1904), Giles (*Myzomyia punctulata*); Les Moust., p. 208 (*Nyssorhynchus punctulatus*, Dönitz) (1905), Blanchard; Ann. Mus. Nat. Hung. III., p. 68 (1905), Theobald (*Cellia punctulata*).

Note.—A series of this species was sent me for examination from the National Museum, Budapest. It proves to be a *Cellia*, and not a *Myzomyia*, as appeared from Dönitz's description. Blanchard erroneously places it in *Nyssorhynchus*.

Additional localities.—Friedrich-Wilhelmshafen, New Guinea (Biró. 1900); Stephansort, Astolabe Bay (Biró. 1901); Isl. Deslacs (Biró. 1901).

CELLIA SQUAMOSA. Theobald (1901).

Anopheles squamosa. Theobald (1901).

Mono. Culicid. I., p. 167 (1901) and III., p. 109 (1903) Theobald; Handbk. Gnats, 2nd ed., p. 314 (1902) and Revis. Anop., p. 45 (1904), Giles.

Additional localities.—This *Anopheline* has been taken by Colonel Penton, P.M.O., at Meshra in the Bahr el Ghazal; also Kajira, Masawa country, West Elgon; Lusinga Island, Kavirondo (Dr. Christy); Kafr el Dawar, Egypt (F. Willcocks). It has been recently sent me from Gondokoro as well by Dr. Aubrey Hodges. It also occurs over Uganda, Mashonaland and the Transvaal, Madagascar (M. Ed. Sergent, M. Ventrillon). It was originally described from specimens taken in Mashonaland by Mr. Marshall and in British Central Africa by Dr. Daniels.

This *Cellia* is very marked and can at once be told from the others members of the genus by its black colour and white markings. There are white scales on the thorax; three white lines on the pleurae, and black, bronzy and ochreous scales on the black abdomen, which has also black lateral tufts of scales. The dark scaled wings have three prominent and two small basal white costal spots, and the legs mottled and banded with white. I have not yet seen a male of this *Cellia*. It will probably be found all down the Nile.

CELLIA KOCHII. Dönitz (1901).

Anopheles kochii. Dönitz (1901).

Insecten-Börse, XVIII., p. 37, 2 (1901), Dönitz; Mono. Culicid. I., p. 174 (1901), III., p. 110 (1903); Revis. Anop., p. 45 (1904), Giles; Ann. Mus. Nat. Hung. III., p. 68 (1905), Theobald.

Additional localities.—Kuala Lumpur (Dr. Durham, 12, 02); Singapore (M. Biró), Java and Sumatra.

CELLIA PULCHERRIMA. Theobald (1902).

Anopheles pulcherrimus. Theobald (1902).

Proc. Royal Soc., p. 369, Vol. LXIX. (1902); Mono. Culicid. III., p. 107 (1903); Revis. Anop., p. 45 (1904), Giles; Les Moust., p. 215 (1905), Blanchard.

Additional localities. — Kokand, Turkestan (Univ. Coll., Helsingfors); Lahore, Meean Mir, Ferozepore in the Punjab (Capts. James and Liston, I.M.S.); Goa, Bombay Presidency.

Characters of eggs and larvae.—The eggs are the same type

as in *M. rossii* and the larvae have the median pair of frontal hairs simple, the outer pair branched. The palmate hairs are present from the second to the seventh abdominal segments, and the terminal filaments of the leaflets are long.

Habits of larvae and adults.—The larvae occur in overflow pools of irrigation watercourses, and the adults have been taken in small numbers in the barracks of native troops and in the outhouses of native bazaars, and during winter a few were found in a native village near Lahore.

Genus **NEOCELLIA.** nov. gen.

Head with upright forked scales only; palpi of ♀ as long as the proboscis, not very densely scaled.

Thorax with flat scales, somewhat spindle-shaped, on both mesonotum and scutellum.

Abdomen with similar scales to the thorax more or less densely scattered all over it; no trace of lateral scale tufts.

Wings with moderately large scales, ending bluntly and rather short. Male palpi with the two last segments, much swollen.

Allied to *Cellia*, but at once told from that genus by the absence of lateral scale-tufts on the abdomen, the less scaled palpi in the ♀ and the smaller wing scales.

The three species tabulate as below:—

Last hind tarsal white.
- Palpi black at apex *indica.* n. sp.
- Palpi white at apex *dudgeonii.* n. sp.

Last hind tarsal not white..... *intermedia.* Rothwell.

Neocellia indica. nov. sp.

Thorax slaty grey in the middle with pale creamy white scales, dark at the sides; palpi dark brown, with two broad white bands and a narrow yellow one towards the base, black at the apex. Abdomen deep brown, with dense creamy scales. Legs brown; all the tibiae, femora and first tarsals with white spots, other tarsals with apical and basal white bands, last hind tarsal white. Wings with six black costal spots, the second and fourth large but not so long as the third, basal ones small; most of veins pale scaled, a few black spots.

♀. Head deep brown with white upright forked scales in the middle in front, black ones at the sides; proboscis deep brown; palpi deep brown, with two broad white bands and a narrow black apex and a third narrow white band towards the base, the two broad white bands are of nearly equal width and involve both sides of the joints.

Thorax slaty grey, with frosty sheen in the middle, deep at the sides, clothed irregularly with large pale creamy-white spindle-shaped flattish scales, which spread on to the scutellum, a white scaled tuft over the back of the head; chaetae brown, golden over the roots of the wings; metanotum brown; pleurae brown with slaty grey sheen in places.

Abdomen deep brown clothed with a number of flattish rather spindle-shaped scales of creamy hue over all the segments, irregularly disposed, and with short golden hairs.

Legs deep brown, the femora, tibiae and first tarsals of all the legs spotted with white, the fore legs with an apical white band on first tarsal and an apical white spot on the second and third tarsals, last two all dark; in the mid leg these markings are absent; in the hind legs there are broad apical and basal white bands, the last tarsal being all white; ungues small, equal and simple.

Wings with six black costal spots, the apical one small, the second large, but not so large as the third, the fourth smaller than the second, the fifth and sixth small; the apical one and the second spread evenly on to the first long vein, the second is broken by two white spots on the first long vein, the fourth



Fig. 23.
Wing of *Neocellia indica*. ♀. n. sp.

spreads evenly over the sub-costal on to the first vein, the fifth and sixth are confined to the costa; the apical spots spread on to the upper branch of the first fork-cell as a larger black area, another small one near its base, an apical small and another larger one on the lower branch; the greater part of the stem is

black scaled; a small apical spot on the third and a long black one basally, with a small white area near the base of the vein; one large basal and one small apical black spot on the upper branch of the second fork-cell, two small ones on the lower, stem mainly black on each side of the cross-veins, basal area white; the fifth has three black spots on the upper branch, two near the fork, one near the apex of the lower and one near its base; the sixth has three spots, the middle one the smallest; the fringe with a pale spot at the end of all the veins.

Length.—4·5 mm.

♂. With the two apical palpal segments much swollen, white ventrally except for a small black spot; there is a narrow white ring on the long segment. Antennae brown, with flaxen brown hairs.

Length.—4·5 mm.

Habitat.—Dehra Dhoon, India.

Time of capture.—February to March.

Observations.—Described from three ♀'s and one ♂. It differs from the other Indian *Cellia*, viz. *C. pulcherrima* in its darker colour, absence of lateral abdominal scale tufts and in the leg and wing ornamentation.

There is no variation seen in the three ♀'s.

NEOCELLIA DUDGEONII. n. sp.

Thorax slaty grey, brown at the sides, with silvery grey scales. Abdomen brown with creamy grey scales. Palpi deep brown with two broad and one narrow white band. Legs brown with all the femora, tibiae and first tarsals much spotted with white, the fore and mid tarsals with narrow apical yellow bands, the hind with broad apical and basal white ones, last hind tarsal all white. Wings mostly creamy-white scaled, costa with four prominent black spots and smaller basal ones, the middle the largest, with three spots beneath it.

♀. Head deep brown, clothed with white upright forked scales in the middle, dark ones at the sides, and with some white narrow-curved ones in front, and two curved tufts of long, white, hair-like scales; antennae brown, the basal segment bright deep testaceous, the next few segments with small flat white scales; palpi thin, as long as the proboscis, deep brown with two broad white bands, one apical, the second close to it, and another narrow white band lower down, beneath this the deep brown

scales are outstanding, but scanty in number; proboscis deep brown, labellae bright yellowish brown, long and thin.

Thorax slaty grey, deep brown at the sides, the grey median area with some minute black specks, and showing longitudinal darker lines in some lights, the whole clothed with white spindle-shaped scales irregularly disposed, a tuft of long white scales in front projecting over the head; scutellum dark in the middle, pale at the sides, with similar white scales to the mesonotum; metanotum deep brown; pleurae showing longitudinal paler and darker lines.

Abdomen deep brown, fairly densely clothed with irregularly disposed creamy yellow scales and with pale golden hairs; no lateral tufts. Legs deep brown, speckled and banded with white and yellow as follows:—All the femora and tibiae much spotted with white; fore first tarsal with three white spots and a white apex, second and third tarsals basally and apically white, last two black; in the mid legs the first tarsal has many white spots and a white apex, and the next two tarsals have a white apex only; in the hind legs the first tarsal has several large and some small white spots, the next three tarsals with broad apical and basal white bands, the last all white; ungues small equal and simple.

Wings with four large and two or three small basal costal spots, the apical one reaches evenly on to the first long vein, and is about the same size as the white area, separating it from the next spot; the second black spot is twice as long as the first, and also spreads evenly on to the first long vein; the third is the



Fig. 24.
Wing of *Neocellia dudgeonii.* (♀.) n. sp.

largest, and has two white spots on the first long vein, otherwise spreading evenly on to it; the fourth not quite as long as the second, and spreads evenly on to the first long vein, while the two basal ones are small and confined to the costa; there are dark scales on the upper branch of the first fork-cell under the apical costal spot, a few dusky scales near its base, some on the

apex of the lower branch, and a few lower down; the stem has three patches of dark scales, one on each side of the cross-vein, and the third near its base; the third has a small dark spot near the apex and another near the base; the fourth has traces of two on each branch, and a long dark area on each side of the cross-veins; the fifth has two small spots on the upper branch, one at the apex of the lower and one near the base; the sixth has three black spots; fringe pale at the junction of each vein with the wing border; fork-cells rather short, the first submarginal longer and narrower than the second posterior, its base nearly level with that of the latter, and its stem nearly as long as the cell; stem of the second posterior cell longer than the cell; supernumerary cross vein about its own length in front of the mid, the mid nearly twice its own length in front of the posterior; apex of wing with the fringe from the third to first long veins yellow. Halteres with pale stem and fuscous knob.

Length 4·8 to 6 mm.

♂. Head, thorax and abdomen similar to the ♀; antennae with flaxen plume-hairs; palpi with the two apical segments swollen, white above, brown below, a narrow brown band near the apex. Fore ungues very unequal, both simple; mid and hind equal and simple, the former larger than the latter. Wings very similar to the ♀.

Length.—5 to 5·5 mm.

Habitat.—Kangra Valley, 4,500 feet (A. G. Dudgeon).

Time of capture.—June and July.

Observations.—Described from several females and males. It is a very marked species, easily told from other *Neocellia* by the much speckled legs, but comes very near James' *Anopheles willmori* in general appearance. It differs from *willmori* in not having apical and basal banding to the tarsi of the fore and mid legs, in the non-spotted nature, and there are no patches of white on the first tarsals, nor is the thorax dark brown, and the head scales are black and white, not all white.

There are no lateral abdominal scale tufts, so it is placed in this genus, as it agrees in all other respects.

Neocellia intermedia. Rothwell.

The Entomologist, February 1907.

Head deep brown, clothed with grey scales in front, and a grey projecting tuft. Palpi brown, with two broad apical and

two narrow basal white bands. Thorax slaty grey in the middle, deep brown on each side with pale scales. Abdomen brown with pale creamy and ochreous scales and golden hairs. Legs brown, speckled and banded with cream colour, tarsal banding very minute on the brown hind legs. Wings with four large costal spots, the two apical ones spread evenly on to the first long vein, the second has two small spots under it on the first vein and the third one.

♀. Head densely clothed with upright white forked scales in front, black ones behind; a few white curved ones in front, with a long irregular tuft of hair-like ones projecting forwards; antennae deep brown, with numerous small white scales and hairs on the basal segments; palpi brown, with two broad bands towards the apex, and two narrow ones on the basal half, the two broad ones separated only by a narrow black ring; proboscis black, pale at the apex.

Thorax slaty grey in the middle, deep brown at the sides, clothed with broad curved, rather flattened creamy scales; pale golden chaetae over the roots of the wings; scutellum slaty grey, paler at the sides, with similar scales to the mesothorax, and brown border-bristles; metanotum deep brown; pleurae brown with grey sheen and some flat creamy scales.

Abdomen brown, with narrow-curved creamy scales, becoming densest on the apical segment and with pale hairs.

Legs brown, the femora and tibiae with yellow spots, the first tarsals with three yellow spots, one apical, the second and third tarsals with minute apical yellow bands; the mid legs much the same; the hind with minute yellow apical bands to all the tarsals but the last.

Wings with four large black costal spots, and one or more small basal ones; the second and third about equal, the first smaller, the fourth rather larger than the first; the first and second spread evenly on to the first long vein; the third spreads evenly on to the sub-costal, and only partly on to the first long vein at its apical end, on two small spots; the fourth unevenly on to the first vein, the small basal one confined to the costa; most of the veins yellow scaled, a dark spot on the upper branch of the first fork-cell just under the apical costal spot, a small dusky patch on each side of the cross-vein; the third with an apical spot, and another on each side of the cross-vein; two on the upper, and two on the lower branch of the second fork-cell, and many dark scales on the stem; the upper branch of the fifth

has a small apical spot, and small ones on each side of the cross-vein, and one on the apex of the lower branch; sixth with three black spots; fringe with pale areas at the ends of all the veins, except the sixth. First sub-marginal cell longer and narrower



Fig. 25.
Wing of *Neocellia intermedia*. ♀. n. sp.

than the second posterior cell, their bases nearly level, the first fork-cell is contracted at the apex, its stem as long as the cell; stem of the second longer than the cell; supernumerary cross-vein in front of the mid, and the mid further in front of the posterior cross-vein.

Length.—5 to 5·5 mm.

Habitat.—Deesa (Major C. G. Nurse).

Time of capture.—January (1902) and August (1901).

Observations.—Described from three ♀'s sent me by Major Nurse. They show some variation in wing markings, especially in the spots under the large costal spot, and in the size of the wings. The first sub-marginal cell is markedly contracted at the apex. The abdominal scales are not so dense as in most other *Cellias*, and are rather thinner in form.

One specimen has the wing marking slightly different on the two wings.

Genus **KERTÉSZIA.** Theobald.

Ann. Mus. Nat. Hung. III., p. 66 (1905).

Intermediate between *Myzorhynchus* and *Cellia*.

Head densely clothed with upright forked scales. Thorax with hair-like curved scales except in front over the head where there are tufts of large narrow-curved ones. Abdomen with long broad irregular scales. Palpi densely scaly. Wing scales as in *Myzorhynchus*. Base of antennae densely scaly.

KERTÉSZIA BOLIVIENSIS. Theobald (1905).

Ann. Mus. Nat. Hung. III., p. 66 (1905).

Head black with median frontal yellow spot. Thorax ashy-grey with two straight parallel median brown stripes, and a broad curved brown stripe on each side. Abdomen dark brown, with dark brown scales and hairs. Legs brown and banded; the anterior first tarsals with yellowish white apical, median and basal bands; the next two tarsals with broad pale apical dorsal area, the brown forming only a small basal area and all over the under surface, last two segments dark; the mid legs with the first tarsal banding not so clear and only the second tarsal with a broad apical pale dorsal area; hind legs as in the mid, but the apical pale areas smaller on the first tarsal.

Wings with four yellow costal spots spreading evenly on to the first long vein; most of the veins dusky scaled, a few pale areas.

♀. Head brown densely clothed with large upright forked scales, black except a small median wedge-shaped area in front and a few yellow narrow-curved ones projecting forwards in front, brown forwardly projecting hairs except in the centre where they are yellow; antennae dark brown, basal joints with dense black scales; proboscis deep brown; palpi densely scaled with black scales and with three narrow yellow apical bands, tip yellow (formed by the third band).

Thorax ashy-grey with two straight parallel median brown lines and a curved brown broader line on each side, covered

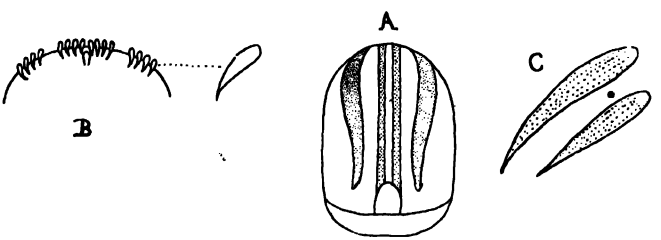


Fig. 26.

Kertészia boliviensis. Theobald. ♀.
A, Thoracic markings; B, front of mesothorax; C, abdominal scales.

scantily with golden hair-like curved scales which arise from black specks; in front three patches of creamy curved scales, ending bluntly. Scutellum with hairs, and brown border-bristles;

metanotum dark brown with traces of a median and lateral dark lines; pleurae reddish-brown with greyish sheen here and there.

Abdomen deep brown clothed with rather irregular large black scales and with deep brown lateral and posterior "border-bristles."

Legs with the femora and tibiae brown, traces of a pale knee spot; on the under surface of femora are also pale patches; first tarsals with three creamy bands, one apical, second and third tarsals with very broad apical yellow areas above (not true bands), last two tarsals all brown; in the mid legs the pale apical areas are only on the first and second tarsals, and the other two pale first tarsal areas indistinct; in the hind legs the apex of the first tarsal pale above and traces of the other two pale spots, the greater part of the second tarsal white (a minute black base), the other tarsals dark brown; ungues small, equal and simple.

Wings with the costa with four yellow spots which spread evenly on to the first long vein, and a small apical yellow spot where the lower branch of the first sub-marginal cell joins the border, extending on to the fringe; the rest of the veins dark scaled except for a pale area along the greater part of the third vein, a trace under the first costal spot on the upper branch of the first sub-marginal cell, another at its base on the stem, one at the cross-veins, one at the base of the fork of the fifth, another

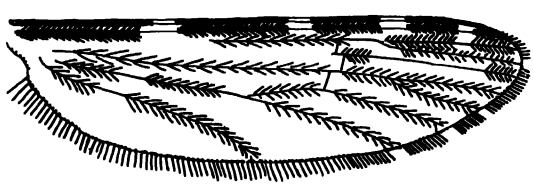


Fig. 27.
Wing of *Kertészia boliviensis*. ♀. Theobald.

on its stem, and a small one on the upper branch near the cross-vein, one near the base of the sixth and minute traces where the veins join the wing fringe; wing fringe with pale areas where the lower branch of the fourth and both branches of the fifth join the fringe; first sub-marginal cell longer and narrower than the second posterior cell, its base slightly nearer the base of the wing, its stem more than half the length of the cell; cross-veins pale, the mid in front of both the supernumerary and posterior.

Halteres with pale stem and fuscous asymmetrical knob.

Length.—5·5 mm.

Habitat.—Songo, Bolivia.

Observations.—Described from a single female. It is a very distinct species told at once by the abdominal scales and thoracic ornamentation. It is one of the largest and handsomest *Anophelines*, and is at present the only one recorded from Bolivia.

Genus **BIRÓNELLA.** Theobald.

Ann. Mus. Nat. Hung. III., p. 69 (1905).

Head with numerous upright forked scales of two kinds, and with small thin outstanding irregular scales; palpi about two-thirds the length of the proboscis in the ♂, swelling gradually to the apex, apparently 2-jointed (probably 3-jointed), last segment large and swollen; proboscis with very acuminate labellae; antennae of ♂ plumose. Mesothorax with numerous short curved hairs over its surface; scutellum as in *Anopheles* (*i.e.* simple, not trilobed). Abdomen nude, but hairy. Wings in the male with the first sub-marginal cell very small, the second posterior large, stem of the former at least four times as long as the small cell; the marginal cross-vein very long, the supernumerary very small, the mid more than twice the length of the supernumerary; the third long vein, also the stem of the second posterior cell, and the upper branch of the fifth vein, bent in gentle waves; the two pseudo-veins very prominent.

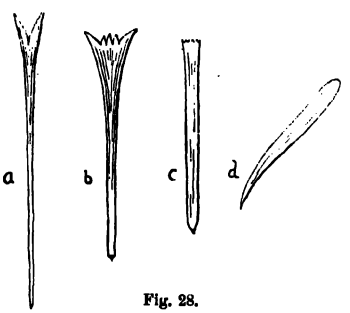


Fig. 28.
Birónella gracilis. Theobald.
Head scales; a, black; b, c, and d, yellow.

This genus apparently comes in the *Anophelina*, judging from the non-scaly thorax and abdomen and the simple scutellum. I have been unable so far to find a female. The most marked feature of the genus is the venation. I know of no *Culicine* in which the cells are so unequal and irregular in shape

and size. The small sub-marginal cell resembles *Megarhinus* and *Toxorhynchites*, and to some extent *Uranotaenia*.

BIRÓNELLA GRACILIS. Theobald (1905).

Ann. Mus. Nat. Hung. III., p. 69 (1905) (Pls. II. and III.).

Thorax brown, with short dull golden hairs; pleurae and scutellum paler; palpi and proboscis brown. Abdomen black, narrow, expanding apically, with brown hairs, which become golden-brown on the large genitalia. Legs long, brown, pale yellowish-brown at the base and below the femora. Wings with brown-scaled veins, the membrane tinged with brown along the costa.

♂. Head brown, with numerous yellowish and black upright fork-scales, the latter very thin with bifid apex, the former broader with expanded apex with numerous serrations, and apparently a few irregular narrow outstanding pale scales of similar size throughout their length.

Proboscis moderately long and thin, clothed with deep brown almost black scales, labellae very acuminate; palpi not quite as long as the proboscis, scaled with deep brown scales, swelling gradually towards the apex, the apical segment large, one joint only can be detected, but probably a basal one exists. Antennae brown with pale bands below the whorls of verticillate hairs, hairs deep brown.

Thorax dark brown with slaty sheen and with short dull golden curved hairs projecting backwards; scutellum pale yellowish-brown; metanotum deep brown.

Abdomen black, nude, but with black hairs, narrow basally, but expanded apically; genitalia densely hairy.

Legs long and thin, brown, the coxae and under side of femora pale ochreous. Ungues apparently all equal and simple.

Wings with brown scales. The sub-costal cell tinged with brown, rest of the membrane transparent; the first sub-marginal cell very small, its stem more than four times the length of the cell; the posterior cell about two and a half times the length of the former and about twice its width; stem of the second posterior cell a little longer than the cell, curved about its centre; the third long vein also curved, continued to the base of the wing as a distinct pseudo-vein; fifth vein with its upper branch distinctly waved, after its junction with the posterior cross-vein; sixth long vein nearly straight until its apex, where

it curves abruptly, a distinct pseudo-vein between the fifth and sixth; marginal cross-vein very long and prominent; the supernumerary very small, the mid as long as the marginal,



Fig. 29.
Wing of *Bironella gracilis*. ♂. Theobald.

joining the supernumerary; the posterior not as long as the mid and close to it. Halteres with the pale stem much swollen basally, constricted apically, the knob black.

Length.—5·5 mm.

Habitat.—Muina, New Guinea (Biró, 1900).

Observations.—Described from three ♂'s, one dissected. It is a very distinct species told at once by the very abnormal venation. I cannot find a female in the collection. As far as I can judge from the male it is an *Anopheline*, but unless both sexes are seen it is quite impossible to place any *Culicid* in any of the sections into which the family is divided. I know of no *Culicine* or *Aedine* or *Megarhinine* in which the abdomen is nude and the scutellum simple.

Genus **CHAGASIA.** Cruz.

Brazil-Medico, XX., 20, p. 199 (1906).

This genus was founded by Cruz for a species named by Lutz (*fajardi*) and placed in the genus *Pyretophorus*. It clearly belongs to another genus as shown by Cruz.

The generic squamose characters are as follows: Head with irregular narrow-curved and other scales and long hairs. Thorax with distinct narrow flat and fusciform scales, some outstanding; a prominent patch of long outstanding scales and some short broad outstanding ones in front of the roots of the wings; scutellum with narrow-curved scales. Abdomen nude but hairy. Palpi densely scaly. Antennae of ♀ with whorls of scales as well as hairs. Wings with large lanceolate scales.

The very distinctive generic characters are (i) the dense long outstanding scales at the sides of the thorax, and (ii) the whorls of prominent scales on the antennal segments.

A single species only is known. It is peculiar in regard to the position it assumes when at rest. The head and its appendages and the thorax form a very marked angle with the abdomen. The greater part of the fore legs lie parallel with the head and thorax and the tibiae of the mid and hind legs with the abdomen. Thus it assumes more the position of *Culex* than *Anopheles*.

CHAGASIA FAJARDI. Lutz (in Bourroul) (1904).

Pyretophorus fajardi. Lutz (in Bourroul) (1904).

Pyretophorus fajardoi. Blanchard (1905).

Chagasia nivae. Cruz (1906.)

Mosq. do Brasil, pp. 16, 36, 64 (1904), Lutz; Les Moust., p. 623 (1905), Blanchard; Brazil-Med. XX., 20, p. 199 (1906), Cruz.

The following is Lutz's original description:—

"Total length 5 mm. (without proboscis which is 2 mm.).

Proboscis, of the same length as the palpi, of a uniform dark colour with a few dark scales.

Palpi.—Densely covered with scales, at the joints paler rings without scales, scales black. *Clypeus* dark with white sheen.

Antennae with some dark scales on the basal segment; basal part of the scourge is dark; but four or five segments lighter; at the base of the segments distinct bunches of dark spatulate scales; verticillate hairs dark, the shorter ones are fine with a white sheen.

Occiput.—In the centre are pale hairs directed towards the front; on the sides darker hairs and long curved scales of a light yellow colour, and others filiform and with a bifurcated apex, nearly all black.

Prothorax with pale hairs and long curved scales, yellow and black.

Mesonotum.—On the anterior part yellow with a golden sheen (as in *Culex confirmatus*), fusiform scales of this colour placed in longitudinal rows, hinder part dark with mixed white gold and black hairs; the sides with black scales fairly long forming groups; ground colour of mesonotum where seen dark fawn. *Scutellum* with a few yellow scales.

Legs dark brown or black, with a great many spots and rings. Femora of the two first pair, swollen apically; the first tarsal has five white rings, others white so that there are eight rings on the foot; on the mid legs twelve rings more or less perfect, last tarsal being quite black; on hind legs the tarsals are white with black apex, but at end have yellowish white rings, knees and venter of femora yellow, these and the tibiae have a great many patches and incomplete rings of a yellow colour.

Wings dark with very transparent scales, like the wings of ***Mansonia titillans.***

Cross-veins and costa yellow, scales long and nearly all black, a few on costa yellow, forming on the margins some very indistinct patches. There are some other pale scales on the long veins. Base of the two-fork cells almost level, but the second a little nearer to the base; the stalks fairly long about half length of cell. Supernumerary and mid cross-veins form an obtuse angle open to the base, the posterior runs parallel with the mid, but a little nearer the base of the wing. Halteres white with a dark knob with small yellowish white scales.

Habitat.—Brazil (Lutz)."

Notes.—Dr. Oswald Cruz, in writing to me, points out the different generic characters very clearly. A female sent by him to the Museum so exactly agrees that it is unnecessary to supplement Lutz's original description.

Cruz records it from Juiz de Fora (Minas, Brazil).

The following species I have not seen or cannot be sure of their actual position.

Anopheles pictus. Loew (1845).

Myzorhynchus? pictus. Loew.

Dipt. Beiträge Posen., p. 4 (1845–1850), Loew; Handbk. Gnats, London, p. 147, 4 (1900), Giles, and 2nd ed., p. 317, 30 (1902), Giles; Brit. Med. Journ. I., p. 307 (1900) (? this species), Thin; C. R. de la Soc. de Biol. LIII., pp. 991 and 993, Laveran (? this species), 1901; Mono. Culicid. I., p. 210, 39 (1901), Theobald; Les Moustiques, p. 191 (Paris), Blanchard (1905).

This is apparently not Ficalbi's *A. pictus* (1896). I believe it to be the same as Grassi *pseudopictus*, but until material is received from Rhode Island, Asia Minor, it is best to leave it undecided.

Dr. Thin records it from Java and Shanghai, and Laveran from Haut-Tonkin and Hariöi. In both cases *M. sinensis* is evidently referred to as an allied species.

Giles (Revis. Anop., p. 27), takes my *Myzomyia leptomeres* (vol. iii., p. 38) to be this species. It does not in the least agree with Loew's description of *pictus.*

ANOPHELES? MARTINI. Laveran (1902).

C. R. Soc. Bio. Paris, LIV., p. 907, Laveran (1902); Les Moustiques, pp. 176–481, Blanchard (1905).

I have been unable to identify this species which Laveran described from Camboge, where it has been found to transmit malaria.

ANOPHELES? VINCENTI. Laveran (1901).

C. R. de la Soc. de Biol. LIII., p. 993 (1901), Laveran; Les Moustiques, pp. 175–481 (Blanchard), 1905.

Described from Tonkin, where it acts as a malaria carrier.
I cannot definitely identify it from Laveran's description.

ANOPHELES? PURSATI. Laveran (1902).

C. R. Soc. Bio. Paris, LIV., p. 907, Laveran (1902); Les Moustiques, p. 176, 481 (1905), Blanchard.

Described by Laveran from Camboge, where it acts as a malaria carrier.
The description is not detailed enough to identify it.

ANOPHELES? FARAUTI. Laveran (1902).

C. R. Soc. Bio. Paris, LIV., p. 908, Laveran (1902).

Described from the Isle Vaté in the New Hebrides.
It is probably *annulipes*, Walker. Giles (Revis. Anop. p. 44) thinks it is *stephensi*, which is most improbable.

ANOPHELES? DECEPTOR. Dönitz (1903).

Myzorhynchus? deceptor. Dönitz.

Beiträge zur Kenntniss der Anopheles, Zeitschrift für Hygiene, XLI., p. 60 and 87 (1903), Dönitz; Mono. Culicid. III., p. 105 (1903), Theobald; Rev. Anophelinae, p. 44, 11 (1904), Giles.

Nothing further can be added as no specimens have yet been seen.

ANOPHELES? ANNULIPALPIS. Arribalzaga (1878).

Vide Mono. Culicid. I., p. 211 (1901), Theobald.

This marked species has not yet been identified and the type cannot be traced—so there is nothing further to add.

ANOPHELES? ANTENNATUS. Becker (1903).

Mitteilungen aus dem Zool. Museum in Berlin, II., p. 68.

Described from Egypt.

ANOPHELES? BRACHYPUS. Dönitz (1903).

Beiträge sur Kenntniss der Anopheles, Zeitschrift für Hygiene, XLI., p. 52 (1903).

ANOPHELES? MACULICOSTA. Becker (1903).

Mitt. a. d. Zool. Mus. in Berlin II., p. 69.

Described from Egypt.

ANOPHELES? MULTICOLOR. Camboulin (1902).

C. R. Acad. des Sciences, CXXXV., p. 704 (1902).

Described from "Isthme de Suez."

ANOPHELES? MINIMUS. Theobald (1901).

Mono. Culicid. I., p. 168 (1901).

The type is too denuded to place it generically until fresh material is received. I fancy it is a *Pyretophorus*, in which genus Giles has ventured to place it (Revis. Anop., 1904).

SUB-FAMILY **MEGARHININAE.** THEOBALD.

ANKYLORHYNCHAE. Lutz.

LYNCHIELLINA. Lahille.

Three genera are now known in this sub-family. The chief characters separating them are given below :—

Palpi of ♀ long.

Genus MEGARHINUS. Rob.-Desvoidy.

Last segment of ♀ palpi round or blunt, seeming as if broken.

Genus ANKYLORHYNCHUS. Lutz.

Last segment of ♀ palpi long and pointed.

Palpi of ♀ short.

Genus TOXORHYNCHITES. Theobald.

Palpi of ♀ not more than one-third length of the proboscis.

In all the *Megarhininae* the scale structure is similar. Head and scutellum scales are flat, and the thorax has dense scales becoming large and spatulate before the scutellum and over the roots of the wings. The proboscis is long and much bent in all, and the small first fork-cell is also common to the three genera. They may or may not have a caudal fan.

That they are closely connected a casual glance will show, yet under palpal classification some should come (*Toxorhynchites*) near *Culex*, and others (*Megarhinus*) near *Anopheles*.

GENUS **ANKYLORHYNCHUS.** Lutz (in Bourroul).

Mosq. do Brasil, p. 3 (1904).

This genus resembles *Megarhinus*, but in the ♀ the palpi have the last segment long and pointed, whereas in *Megarhinus* the long ♀ palpi end as if broken off; being rounded or blunt.

Three species are included, which tabulate as follows:—

Feet of ♀ all same colour.
No caudal tuft..... *neglectus*. Lutz.
Bronzy-black caudal tuft *trichopygus*. Wiedemann.
Second and fourth middle tarsals white below *violaceus*. Wiedemann.
(= *purpureus*. Theobald).

ANKYLORHYNCHUS NEGLECTUS. Lutz (1004).

Mosquitos do Brazil, p. 14 and 65 (1904).

The following is Lutz's description:—

"*Proboscis.*—Longer than the palpi, black, with blue scales at the bend.

Palpi.—With three long segments, the second being larger than the first and the third larger than the second. The scales on the feelers in

most cases dark, but on the extremity of the two first segments and the middle part of the second are iridescent blue and red scales; the dark scales also have a metallic brilliancy of a dark violet hue; on the ventral sides of all the segments are many yellow scales with a golden sheen.

Antennae.—Smaller than the palpi (but longer than their first two segments), hairs dark, smaller ones with a white sheen.

Clypeus.—Clypeus same colour as the torus of the feelers. Eyes brown.

Occiput.—Flat scaled; sea green with darker ones at the back and on the sides white.

Mesonotum, black with sea green scales, brilliant; a great many golden scales on the scutellum.

Metanotum bare, greyish-yellow.

Pleurae and coxae.—Densely covered with white scales.

Abdomen.—First and second segments green, the third and fourth only so on the anterior areas, the posterior being a little blue; on the fourth the colour changes to a reddish violet and continues so until the last segment. Colours very brilliant metallic. No caudal tuft. Below yellow or white with the exception of a middle column of violet which is pointed and dilated on all the segments.

Legs all one colour, violet blue, with metallic tints, no white bands, but with under side of coxae of a light dull golden colour.

Note.—Described from a specimen reared from a larva found in bromelia water near São Paulo."

Genus **MEGARHINUS.** Robineau-Desvoidy.

Lynchiella. Lahille.

Essai sur les Culicides, Mém. Soc. d'Hist Nat. de Paris, III. (1827), p. 412; Dipt. Exotica, 1, pl. 1, fig. 1 (1838), Macquart; Proc. Linn. Soc. N. S. Wales, III., p. 1729 (1889), Skuse; Règne. Anim. V. 439; Cur et Latreille (1829); List. Dipt. Brit. Mus. I., p. 1 (1848), Walker; Dipt. Argentina, p. 31 (1891), Arribalzaga; Mono. Culicid. I., p. 215 (1901), and III., p. 113 (1903), Theobald; Genera Insectorum, Fam. Culicid. p. 12 (1905), Theobald; Les Moustiques, p. 220 (1905), Blanchard; Class. Mosq. Tec. Se. 11, U. S. Dep. Agri., p. 14 (1906), Coquillett.

SYNOPSIS OF THE GENUS MEGARHINUS.

Apex of abdomen with no lateral tufts.
- Tarsals with some white bands *ferox.* Wied.
- Tarsals unbanded.
 - Abdomen olive green *longipes.* Theob.
 - Abdomen violet and purple *mininus.* Theob.

Lateral tufts red.
3rd segment of palpus as long as 4th *separatus.* Arri.
3rd segment of palpus longer than 4th *haemorhoidalis.* Fabr.
Lateral tufts not red.
Feet all same colour ♂ and ♀.
Caudal tuft brown and golden *mariae.* Bour.
One tarsal white in hind feet.
Caudal tuft steel-blue and white..... *portoricensis.* V. Roeder.
All hind tarsals white except a black ring at distal end *herrickii.* n. sp.
White or gold band on the ventral side of mid foot *solstitialis.* Lutz.
White on fore, mid and hind feet; caudal tuft golden orange *splendens.* Wied.
Second tarsal segment of hind legs white; caudal tuft golden *lutescens.* Theob.
A pale band at base of first tarsal of hind legs; caudal tuft blackish-brown, a few white hairs in front *dewaldi.* Ludlow.
Legs unbanded; caudal tuft brown *chrysocephalus.* n. sp.

Position of *M. inornatus*, Walker, uncertain, also *M. grandiosus*, Williston, and *M. rutilus*, Coquillett.

Megarhinus ferox. Wiedemann (1828).

Culex ferox. Wiedemann.

Auss. Zweif. Insek, p. 1 (1828), Wiedemann; Dipt. Exot. Supp. II., p. 7 (1846), Macquart; Cat. Dipt. Ins. Brit. Mus., p. 1 (1848), Walker; Bull 4 (N.S.), Div. Ent. U. S. Dept. Agri., p. 24 (1896), Howard; Handbk. Gnats, p. 135 (1901), and 2nd ed., p. 277 (1902), Giles; Mono. Culicid. I., p. 237 (1901), Theobald; Les Moust., p. 225 (1905), Blanchard.

Additional localities.—São Paulo, São Simão, and Bahia Itaparica (Dr. Lutz).

Megarhinus separatus. Arribalzaga (1891).

Dipt. Argentina, II., p. 133 (1891), Arribalzaga; Mono. Culicid. I., p. 219 (1901), and III., p. 114 (1903), Theobald; Les Moustiques, p. 222 (1905), Blanchard.

Additional localities.—São Paulo and São Simão, State of São Paulo; Itaparica, Bahia; Bogota, Columbia (Dr. Lutz).

Megarhinus mariae. Bourroul (1904).

Mosq. do Brasil, p. 3 (1904).

"Length (without proboscis), 10–11 mm.; proboscis, 7 mm.; wings, 5 mm.

Proboscis.—Thin, black; below on the ventral half are many brilliant golden scales, also blue and red ones.

Palpi.—Less than two-thirds the length of the proboscis, with three long segments; the first being more than half the size of the second, which

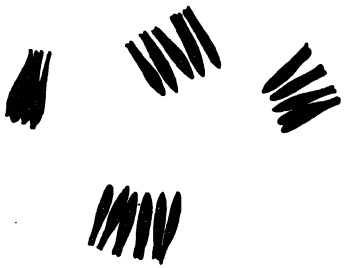


Fig. 30.
Ova of *Megarhinus separatus*. Arri. Enlarged (after Goeldi).

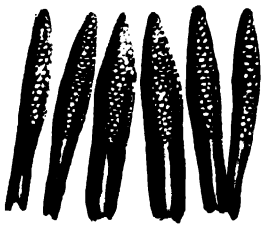


Fig. 31.
Ova of *Megarhinus separatus*. Arri. Still further enlarged (after Goeldi).

is the same size as the third. Covered with brilliant scales above, blue and purple; golden below with the apex of the segment violet. *Clypeus* dark with a frosty sheen like the hairs (toros?) of the antennae.

Antennae.—Shorter than the palpi, only half the length of the proboscis, the verticillate hairs dark, almost black, with many fine hairs and white annuli at the joints; second segment with scales on the basal half.

Occiput.—With many dark scales, iridescent with green, sky-blue and purple, white and gold, and with some dark hairs with a golden sheen.

Prothoracic lobes.—With similar hairs and scales as the occiput, the latter prevalent, sky-blue.

Metanotum.—Dark golden colour inclining to olive and divided at the posterior half by a blue band, which passes over the scutellum. The scales are fusiform or oblong, long, densely grouped and very salient, growing like the feathers of a bird, the centre dark but iridescent, the gold prevalent on the sides of the green and sky-blue; the colours in the line mentioned are sky-blue and dark green.

Pleura.—Colourless, with a golden sheen and white mother-of-pearl scales.

Scutellum with prevalent sky-blue flat scales and golden hairs.

Metathorax bare, colourless, with golden sheen.

Abdomen.—Dorsum of first segment with a greenish, sky-blue sheen, the rest dark violet. With a microscope the oval or spatulate scales are to be seen on a dark ground, densely grouped, overlapping, iridescent in colour. On apex of sixth segment are lateral golden hairs, dark on the seventh, forming a lateral appendice, the eighth segment with golden hairs, the ninth, which is slightly visible, is of a golden hue. Ventrally golden and silver scales prevail, having median sized violet bands. The ground colour dark grey, almost black on the sixth and seventh segments.

Legs of an uniform colour, all but the ventral surface of the femora, which is of a golden colour, the rest violet with blue and red tinges. The four anterior ungues are a little larger than the posterior.

Wings long; first fork-cell very short and narrow, its length being a quarter of the size of the stem. The supernumerary and mid cross-veins form a very obtuse angle, the posterior cross-vein is nearly four times its own length nearer the base. Scales of the long veins thin and spatulate, more or less dark, with iridescent gold, purple and blue hues.

Note.—This species is a typical *Megarhinus* which has the three-jointed palpi, ending bluntly in hairs.

It is very like in colouring to *Megarhinus solstitialis;* however, it is larger and very much more robust, and the golden colour is deeper.

The chief distinction between the ♀'s of the two species is in the absence or presence of a light ventral band on the middle tarsus.

The larvae differ very much more; that of *solstitialis* is quite red, that of *marine* is red spotted with mother-of-pearl and green on the thorax.

Distinguished from *trichopygus* (described by Wiedemann and Theobald), which is an *Ankylorhynchus*, and which has the third segment of the palpi pointed; besides that it differs in some other respects.

The posterior end has no lateral fan of scales.

Bred by us from bromelia water from the Isle of Itaparica (State of Bahia)."

Note.—I have been unable to obtain this species so have given a translation from the Portuguese kindly made for me by Miss de Mascarenhas of Lisbon.

MEGARHINUS HERRICKII. Theobald (1906).

Megarhinus portoricensis. Herrick (non Von Roder) (1905).

The Entomologist, XXXIX., p. 241 (1906), Theobald; Entomo. News (1905), p. 281, Glenn-Herrick.

Allied to *M. portoricensis*, Von Roder, but differs in the following respects:—

(i) The last segment of the male palpus much longer than the penultimate, at least twice as long, and (ii) the head iridescent bluish green instead of brown with a shiny white border around the eyes, white scales laterally, and azure blue spots in front; (iii) the hind tarsals are white except a black ring at the distal ends, whilst in *portoricensis* the penultimate tarsal segment only is white save for a small basal dark spot.

Habitat.—Mississippi State, U.S.A.

Observations.—This species is referred to by Professor Glenn

Herrick as *portoricensis*, but he points out very obvious and marked differences. I have placed it as a new species, which is named after him.

The specimens were bred from larvae taken "in the cup-like bottom of a massive iron post supporting one corner of a large water tank. . . . Here we found five large, dark brown, very spiny larvae, and also remnants of cast pupal skins, conspicuous for their long spines, made especially prominent by the colonies of Vorticellae clinging to them. . . . We fed the larvae entirely on *Culex* larvae, and great numbers of the latter were devoured. For example three *Megarhinus* larvae in four days ate eighty-three large *Culex* larvae besides many small ones just hatched from eggs.

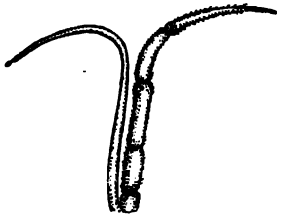


Fig. 32.
Megarhinus herrickii (♂). n. sp.
Palp and proboscis.

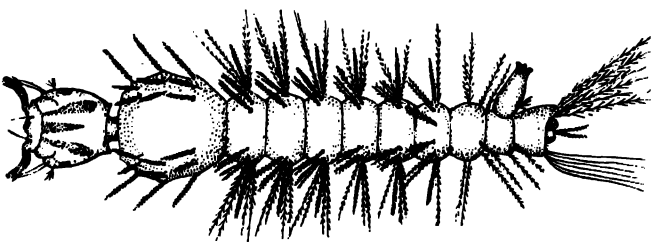


Fig. 33.
Larva of *Megarhinus herrickii*. n. sp.
(After Glenn Herrick.)

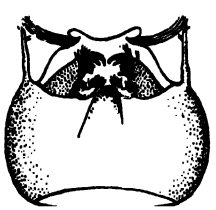


Fig. 34.
Head of larva of *Megarhinus herrickii*. n. sp.

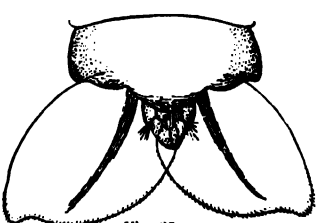


Fig. 35.
Caudal end of pupa of *Megarhinus herrickii*. n. sp.

The larvae transformed to pupae on September 28th.

The pupal stage lasted four days while that of the third

extended over a period of five days. The anal flaps seem to have a characteristic shape, and the edges, for the most part, are beset with short stiff spines."

The figure is reproduced from that of Professor Glenn Herrick's (Ent. News, Vol. XVI., Nov., 05).

MEGARHINUS SOLSTITIALIS. Lutz (1904).

Mosquitos do Brasil, p. 10 (1904), Lutz (in Bourroul).

Head dark, with golden, green and blue scales. Thorax with metallic green and bronze scales, an azure-blue line in front of the roots of the wings, and azure blue prothoracic lobes. Abdomen green at the base, metallic violet and coppery red, dark caudal tufts and white lateral spots. Mid legs of ♀ with one band. Male palpi purple with a golden patch beneath the penultimate and antepenultimate segments; a pale golden mark below on the penultimate segment of female palp.

♀. Head covered with flat azure-blue scales in front with peacock-green reflections, deep brown scales behind, almost grey ones at the sides, with a few black bristles projecting forward, the two median ones cross one another. Proboscis metallic violet; palpi metallic violet, not as long as the proboscis, terminal segment blunt, only about two-thirds the length of the penultimate which is as long as the antepenultimate, three thick black spines at the apex and mauve hues at the joints; ventrally the penultimate segment has a pale creamy area; antennae brown, basal segment deep brown, frosty on each side, second segment large densely scaled, scales brown with brilliant metallic hues, the third and fourth densely scaly; the next seven or eight segments with scales at the region of the verticillate hairs; clypeus frosty.

Thorax deep shiny black, clothed with metallic bronzy green scales, a small area of azure-blue ones in the middle line in front, amounting to a dozen scales or so, an azure-blue area on each side in front of the roots of the wings, in front of the scutellum and over the roots of the wings the scales become much larger and broader especially over the former, and are blue at the sides, peacock-green and bronze in the middle, very small bronzy scales over the usually nude area in front of the scutellum behind these large flat scales; scales of the scutellum mostly pale blue, some green basal ones and some dark ones on the lateral lobes, pleurae with dense white scales; prothoracic lobes blue, with

some grey scales; chaetae black; metanotum bright chestnut brown.

Abdomen with basal segment green in the middle, violet on each side with a creamy lateral spot, remaining segments brilliant violet purple, in some lights some of the scales have a brilliant coppery red hue scattered amongst the purple-violet ones and collected more densely on the apices of some segments, basal triangular creamy-white lateral patches, the sixth segment with a lateral apical tuft of creamy-white hairs, the seventh and eighth with bronzy-black tufts, terminal chaetae golden brown; venter silvery-white with a median narrow purple line.

Legs with metallic violet and coppery hues, the latter especially on the tarsi; under side of femora creamy-white to golden yellow; on the mid legs the second tarsal is creamy-white scaled to golden yellow; ungues equal and simple.

Wings with the first fork-cell very small, its stem three and



Fig. 36.
Wing of *Megarhinus solstitialis* (♀). Lutz.

a half times as long as the cell, its base nearer the apex of the wing than that of the larger broader second posterior cell, whose stem is not much more than twice as long as the length of the cell; supernumerary cross-vein nearly four times its own length nearer the apex than the mid; the mid close to the very long, backwardly-directed posterior cross-vein; scales on the outer border with violet and bronze reflections.

♂. Head much as in the ♀ but rather darker scaled; antennae with deep brown plume-hairs and dense scales on the second and many following segments; palpi metallic violet above with mauve joints, beneath is a golden scaled area on the penultimate and antepenultimate segments. Apical segment acuminate, not quite twice as long as the penultimate, the antepenultimate not quite as long as the apical one.

Thorax much as in the female.

Abdomen similar, but the basal segment has more green scales, the sixth to eighth swollen, bearing the caudal tuft which is deep brown with violet hues, the anterior part on the sixth segment paler than the rest; fore and mid ungues unequal, the larger uniserrate, the smaller simple; hind equal (simple?).



Fig. 37.
Wing of *Megarhinus solstitialis*. Lutz. ♂.

Wings with the first fork-cell less than half the size of the rather large second posterior cell, its base much nearer the apex of the wing, about the middle of the second posterior cell; stem of the former about three and a half times longer than the cell;



Fig. 38.
Head of larva.
Megarhinus solstitialis. Lutz.

stem of the second posterior cell not quite twice the length of the cell; supernumerary cross-vein nearly four times its own length nearer the apex than the mid; posterior very long, sloping backwards, a little nearer the base than the mid. Scales with violet and purple sheen.

Length.—8 to 9 mm.

Habitat.—São Paulo, Brazil (Dr. Lutz).

Time of capture.—June and July.

Observations.—Redescribed from a perfect ♂ and ♀ given me by Dr. Lutz.

The black caudal tuft of the ♂ separates it from all species but *trichopygus*, the palpi, however, at once distinguishes it from that; in the ♀ the caudal tuft is black also, but there is a *white* tuft in front of it on each side. It seems to be the most abundant *Megarhinus* in São Paulo.

The larvae are carnivorous and have been taken in the waters of wild bromelias principally *Aechmea tinctoria*.

The males, Lutz states, can be found in woods where they fly about rapidly.

MEGARHINUS CHRYSOCEPHALUS. n. sp.

Head entirely clothed with burnished golden scales with coppery sheen. Thorax clothed with golden-brown and coppery scales, an azure blue line in front of the wings; prothoracic lobes mauve. Abdomen metallic violet basally, purple red apically with small lateral basal silvery white spots, caudal tuft of ♂ deep brown; palpi purple with brilliant coppery sheen, golden beneath the second and third segments, a white spot at the apex of the antepenultimate segments above. Legs unbanded.

Allied to *M. solstitialis*.

♂. Head entirely clothed, with flat burnished golden scales, violet towards their bases, those along the nape deep violet, those at the sides paler, two bright golden median chaetae, the others brown.

Palpi deep violet with brilliant coppery-red sheen, apex of first segment white, the acuminate apical segment is not quite twice the length of the penultimate, the antepenultimate about the same length as the penultimate, the next segment smaller, the apices of the segments slightly swollen.

Antennae with dense mauve and creamy scales on the large second segment, a few pale golden ones on the next few following it; plume-hairs deep brown; proboscis deep metallic violet, thin, labellae long and acute.

Thorax deep brown, clothed with broad spindle-shaped metallic bronzy scales, some flat azure-blue ones in front of the roots of the wings; over the roots of the wings some long flat

scales, pale blue at their base, apple green apically, across the back of the mesonotum shorter flat scales mostly brilliant coppery-red, blue, green and mauve.

Scutellum with dense flat deep golden scales in the middle, longer pale blue and apple green ones at the sides; chaetae black; metanotum brown; prothoracic lobes with purple, azure-blue and golden flat scales (the whole having a mauve tint under a hand lens); pleurae densely white scaled.

Abdomen entirely deep metallic violet with small basal white lateral patches, caudal fan blackish-brown, the hairs on the sixth segment pale.

Legs deep metallic violet with bronzy reflections.

Wings with the first submarginal cell small, about two-thirds the length of the second posterior, its stem about three and a half times the length of the cell, stem of the second posterior about one



Fig. 39.
Wing of *Megarhinus chrysocephala*. n. sp. ♂.

and three-fourths the length of the cell; supernumerary cross-vein small, about six times its own length in front of the mid, the long backwardly projecting posterior cross-vein meets the mid.

Halteres pale creamy.

Length.—8·5 mm.

Habitat.—São Paulo, Brazil (Dr. Lutz).

Time of capture.—August.

Observations.—Described from a ♂ given me by Lutz under the name *solstitialis*. It differs considerably from that species, firstly in the head being deep burnished golden yellow, secondly in the white spots on the palpi, thirdly in the marked scutellar adornment, fourthly in the absence of the green basal abdominal segment, and fifthly in the venation. The legs in the specimen were damaged. For beautiful coloration this species vies with all the others.

MEGARHINUS? MINIMUS. Theobald (1905).

Journal Bombay Natural History Society, Vol. XVI., p. 237 (1905).

Thorax shiny black with metallic bronzy scales, some blue and green scales at the base of the wings; pleurae silvery white; prothoracic lobes blue. Head bronzy brown with metallic green and blue border around the eyes. Palpi long, acuminate and thin, deep violet; proboscis deep violet. Abdomen metallic violet and purple with creamy lateral spots, the apical segment coppery red; basal lobes of genitalia deep brown. Legs brown with violet reflections, creamy at the base of the femora and below the femora.

♂. Head black with deep bronzy brown flat scales behind and over most of the surface with sometimes metallic reflections and with metallic green and blue scales around the eyes. Two black chaetae project forwards between the eyes and one on each side of the median pair.

Antennae brown, the basal joint large and globular, black with a grey sheen at the sides; clypeus black; proboscis metallic violet; palpi long, thin, metallic violet, acuminate; composed of four segments, the acuminate apical one slightly longer than the penultimate segment, the penultimate and the preceding one nearly equal; on the penultimate segment are a few short black spines.

Thorax shiny black clothed with metallic brassy flat scales of two sizes, mostly spindle-shaped, with a patch of pale blue ones at the base of the wings and a few rather short black spines; just behind the root of the wings are some large flat apple-green scales. Prothoracic lobes clothed with flat mauve and pale blue scales; scutellum black with small flat brassy, green and coppery scales on the large mid lobe, dusky ones on the lateral lobes; border-bristles brown; metanotum dark brown; pleurae yellowish-brown with dense flat snowy white scales.

Abdomen expanding apically, metallic, deep blue and violet basally and extending to the last few apical segments which are more brilliant, their bases with green and blue scales, their apical portions with violet and coppery red, the apical segment and to some extent the basal lobes of the genitalia with fiery red and coppery scales; no caudal tuft, but the two last segments have short, dense, black lateral bristles; on the first segment is a large creamy lateral patch, there are also more or less prominent basal

creamy lateral patches to the other segments; venter creamy yellow, except for the black apex.

Legs uniformly black with metallic violet scales; fore ungues unequal, the larger uniserrated, of the hind legs also unequal, and apparently simple, those of the hind small, much curved, equal and simple.

Wings small, scales brown, those at the base showing violet reflections; the first sub-marginal cell so minute that it is scarcely perceptible to the naked eye; second posterior cell fairly large and broad about half the length of its stem; the third long vein carried well past the cross-veins as a scaled vein; supernumerary cross-vein about three times its own length nearer the apex of the wing than the mid, mid cross-vein small, joining the posterior cross-vein which is about five times the length of the mid. Halteres dull ochreous.

Length of body 6 mm.; of palpi 4 mm.

Habitat.—Yatiyantota, Ceylon (E. E. Green).

Time of capture.—March (1902).

Observations.—Described from a single perfect ♂. Whether it will come in *Megarhinus* or *Toxorhynchites* it is not possible to say, but I fancy it is a true *Megarhinus*. Its small size will at once separate it from all known members of the two genera. It is also peculiar in having spines or bristles in the place of a caudal fan and in the very minute first fork-cell. The abdomen shows all manner of metallic and colour reflections.

MEGARHINUS LE WALDII. Ludlow (1904).*

Megarhinus waldi. Blanchard (1905).

Canad. Entomo., Vol. xxxvi., p. 233 (1904). Les Moust., p. 625 (1905) Blanchard.

Thorax dark brown with peacock-blue and green scales, bluish white laterally.

Abdomen blue-green, small white lateral spots on some of the segments; caudal tuft blackish-brown, a few white hairs in front. Legs dark blue, tarsals purplish-brown, a pale band at base of second tarsal of hind legs, one at base of mid first tarsal and also second tarsal; fore legs all dark.

"♂. Head dark brown with flat iridescent scales appearing blue and green with a pale blue almost white rim around the eyes; antennae dark

* This may also be a *Toxorhynchites*.

brown; plume hairs very dark; basal segment with fine white tomentum, first segment of flagellum long, densely scaled, the scales iridescent purple and white; proboscis and palpi black, a few iridescent scales on the first segment of latter, last segment twice as long as the penultimate and acuminate; eyes blue. Thorax dark brown, densely covered with scales which show peacock blues and greens all over the dorsum, almost bluish white laterally; scutellum coloured as the mesonotum, the lateral lobes paler than the mid; prothoracic lobes scaled as the mesonotum; pleurae dark brown with dense white scales; metanotum dark brown. Abdomen dark, showing blue-green iridescence. First segment with a brown median spot, light blue sub-median and white lateral spots; border bristles very small, the sides with dense white hairs which connect with the dark blackish-brown caudal tuft. Traces of small white lateral spots on some of the segments. Venter dark. Legs with coxae densely white scaled. Hind femora dark blue dorsally, ventrally white; tibiae dark blue; first tarsals dark; second tarsal basally white banded, tarsals unbanded, showing brilliant purple reflections; ungues equal, simple, rather straight; mid legs all dark except for a pale band at base of the first tarsal and second tarsal, often scarcely perceptible; fore legs all dark; fore and mid ungues large, unequal, the larger uniserrated.

Wings sparsely scaled; scales on costa blue and iridescent. First sub-marginal cell about one-half the width of the second posterior; stems very long, in the former nearly three times the length of the cell. Supernumerary cross-vein nearly the length of the mid and more than four times its length exterior to it; posterior cross-vein nearly twice as long as the mid, which it meets.

Length.—11 mm.

Habitat.—Salog, Guimaras Island, Philippine Islands."

Observations.—Described by Miss Ludlow from a perfect ♂ bred by Dr. L. T. Le Wald, U.S. Army, from larvae taken on April 1st, and hatched April 10th. The caudal tuft should at once separate it from *T. immisericors* and *T. speciosa.*

It is probably a Toxorhynchites.

Genus **TOXORHYNCHITES.** Theobald.

Mono. Culicid. I., p. 244 (1901), and III., p. 119 (1903), Theobald; Handbk. Gnats, 2nd ed., p. 278 (1902), Giles; Genera Ins. Fam. Culicid., p. 13 (1905), Theobald; Les Moust., p. 229 (1905), Blanchard.

Two new species have been added to this genus since the issue of Vol. III. and Mr. Ernest Green has worked out the life-history of *Toxorhynchites immisericors*, Walker, a *précis* of which is given here under the heading of that species.

I believe Dr. Leicester is describing some more species from the Malay Peninsula. Although I have the specimens, they must unfortunately be left until his descriptions are issued.

TOXORHYNCHITES IMMESERICORS. Walker (1860).

Megarhinus immesericors. Walker (1860).

Culex regius. Thwaites MS.

Megarhinus gilesii ♀. Theobald (1901).

Megarhinus subulifer. Dolleschall (1857 ?).

Journ. Proc. Linn. Soc. Lond., p. 91 (1860); Proc. Linn. Soc. Zool. V., p. 202 (1864), Walker; Mono. Culicid. I., p. 225 (1901) (*immisericors*), p. 227 (*gilesii*); III., p. 123 (1903); Proc. Roy. Soc. LXIX., p. 381 (1902), Theobald; Handbk. Gnats, p. 129 (1900), and 2nd ed., pp. 273-274 and 514, Giles (1902); Les Moust., p. 230 (1905), Blanchard; Spolia. Zeylandica, II. Pt. VIII., p. 159 (1905), Green.

Ernest Green has given many new details concerning this species (Spo. Zey. II. Pt. VIII., pp. 159 to 164, and plate, 1905).

He states that it is not an uncommon insect in the Royal Botanic Gardens, Peradeniya (altitude 1,500 feet). He has also taken it at Pundalu-oya at an elevation of 4000 feet. The adult may be found resting on the trunks of trees, and still more frequently on the stems of the Giant Bamboo (*Dendrocalamus giganteus*). It occasionally flies in at the open window of a room (always in the daytime).

Mr. Green states he has never known it bite. Females were kept alive for eleven days on sliced bananas.

Life history.—The eggs were laid singly and scattered over the surface of the water, and do not tend to run together as those of *Anophelinae*. The egg is 0·55 mm. long by 0·37 mm. broad, creamy white, the surface closely studded with spinose granules of varied sizes. Some of the ova hatched in two days, dividing transversely across to liberate the larva. Young larvae appear to rest horizontally when viewed dorsally.

Their carnivorous habits were noticed. As they grow they become bright reddish above, paler below—head and terminal parts olivaceous brown.

Green found that the natural breeding-place was in the hollow stumps of the giant bamboos, and in small pools in the angles of the branches of other trees.

The cannibal habits seem to destroy its usefulness as a culex destroyer, for it appears to feed upon all its own race first before

it will attack other species found in the same water. When mature the larvae reach 16 mm. long, are dull reddish purple above, paler beneath and opaque.

Green found many fully-grown larvae deeply encrusted with *Vorticellae.*

The figure of the pupa given in Vol. III. is not quite accurate according to Green. It was figured from a rather shrivelled alcohol specimen. The pupal stage lasts five to six days. Green also notices a broad purple-blue median band on the venter: this does not seem to appear in dried specimens.

TOXORHYNCHITES LEICESTERII. Theobald (1904).

The Entomologist, Vol. XXXVII., p. 36 (1904).

Thorax with metallic green scales, an azure spot over the wings. Abdomen purple, banded with pale blue. Legs unbanded in the male, banded with white in the female; the last two tarsals white.

♀. Head black, covered with broad flat scales; along the orbital margin is a narrow band of scales broadening out laterally, which are peacock-blue, in some lights they show purple; the rest of the upper surface of the head is clothed with metallic golden scales. Immediately around the nape are a few upright forked scales, dark golden in colour; on the vertex are four golden-brown bristles. Eyes black. Antennae with basal segments black, frosted, naked; remaining segments black at the nodes, brown at the internodes; verticillate hairs black. Palpi very short, of three segments, not more than one-sixth the length of the proboscis; first segment swollen at the base and constricted, the last segment small and nipple-like; scales broad, spatulate, under a hand-lens dark brown, in stronger light rich blue, except at the tip, where the scales vary from rose-purple to mauve according to the angle at which the light strikes them. Proboscis broad at the base, long and bent, covered with purple and rose-purple broad scales; at the angle the scales are golden-green and some peacock-blue mixed among them. Prothoracic lobes small, oval, rather prominent; thickly clad with scales which are purple-blue or rose-purple as the position to light is varied.

Mesonotum black, densely covered with broadly spindle-shaped metallic green scales; over the bases of the wings the

scales are larger, longer, and spatulate-shaped. (In fresh specimens the colour is said to be like a green bottle-fly.)

If the thorax is examined through a lens, the central part looks dark coppery-brown to purple, while the sides, when the light strikes at an angle, show metallic green—in other lights the scales appear bluish-green or dark coppery-red; at the anterior margin of the mesonotum is a band of scales which appear violet, rose-purple or purple, according to the light, and below this a triangular patch of silvery scales immediately behind the prothoracic lobes, and over the roots of the wings a patch of peacock-blue scales and a row of short, stout black bristles.

Scutellum densely clothed with broad, long flat scales, which on the lateral lobes are of peacock-blue or metallic green, according to the light, and on the central lobe of a dark green fringed with lighter green posteriorly.

Scutella bristles short, dark brown. Metanotum, dark brown.

Wings brown in colour; the costa and first longitudinal vein clad with broad, flat scales, which are peacock-blue, golden green, and purple, according to the light; the position of the cross-veins, the size of the fork-cells and the scaling of the other veins is that of a typical *Toxorhynchites*. Legs with the coxae yellowish, mid and hind clad with creamy scales on their outer face; fore legs with the upper surface of the femora clad with rose-purple scales; at the extreme apex is a tuft of long spindle-shaped scales, which are white or peacock-blue; just behind these are black spines placed in a semicircle; the whole of the under surface is covered with bright golden scales; tibiae entirely covered with purple scales; a short distance from the base of the first tarsal is a ring of creamy-yellow scales; the fourth and fifth tarsals mostly covered with creamy scales, the rest of the tarsal segments with purple scales; mid legs, femora and tibia as in the fore legs; the basal half of first tarsal with creamy scales, apical half purple scaled; all the tarsal segments creamy scaled. Hind legs golden at the base and on the under side, purple above; scales at apex similar as in the other legs; tibia purple scaled; first tarsal purple scaled, except for a broad ring of creamy scales a little beyond its base; second and third tarsal segments purple scaled; fourth and fifth creamy scaled; ungues equal and simple on all the legs. Pleurae dark brown, for the most part covered with silvery grey scales. Abdomen with the dorsum of the first segment covered with peacock-blue scales, in some lights a dark green; the other segments covered

with rose-purple scales, basal banding of peacock-blue scales. Venter bright golden, except for a patch of dark scales on the fourth segment; the last segment fringed with pale golden hairs; no caudal tuft.

Length.—10 mm.

♂. Head with a deep depression in the middle line; the scaling is much as in the ♀. Antennae banded brown and white; plumes black; basal segment black; second segment scaled with numerous golden scales, the two last segments dark and elongated. Palpi three-jointed, the first segment with a swollen base, having the appearance of a joint constricted in the middle; the second scaled with golden scales except at the apex, where there is a narrow band of purple-blue scales; in the middle there is also a band of purple scales and towards the base there are on the upper surface purple scales. Proboscis purple-scaled, green-scaled at the angle. Thorax as in the ♀. Legs with the coxae and under sides of the femora gold-scaled; knee spots peacock blue or creamy in some lights; the remaining parts of legs purple scaled; no banding. Ungues, fore and mid unequal, the larger uniserrate. Abdomen as in the ♀.

Length.—10 mm.

Habitat.—Kuala Lumpur, Federated Malay States.

Observations.—Described from two perfect specimens collected by Dr. Leicester.

The beautifully adorned abdomen, metallic-green thorax, with azure root spots to the wings and the last two white hind tarsals of the female are very characteristic.

TOXORHYNCHITES METALLICUS. Leicester (1904).

The Entomologist, Vol. XXXVII., p. 37 (1904).

Thorax brilliant metallic green; abdomen deep rose purple, with basal creamy yellow bands; no caudal tuft. Legs in the male unbanded, in the female the mid legs have a basal creamy-white band; fore and mid unbanded. Male palpi with the second and third segments golden yellow.

♀. Head black; a narrow band of creamy-yellow scales along the orbital margin, which laterally broadens into a distinct patch; the rest of the upper surface of the head is covered with broad flat scales which vary in colour. If looked at from behind, the centre patch looks bronze-green and the scales at the sides blue-green. (In one specimen the whole patch is a deep rich

blue, while the marginal scales are silver.) Immediately above the occipital foramen are a few fawn-coloured upright scales scarcely notched; a few small bristles are placed on the vertex which look black or purple or even golden-brown according to the light. Antennae with the basal segment black, with a silvery tomentum save for a few short white hairs; the second segment scarcely swollen, light yellowish colour, with a few black spatulate scales on its upper face; the succeeding segments black with white pubescence; the verticillate hairs black. Clypeus black with silvery sheen, notched on either side. Palpi short, not more than one-fifth the length of the proboscis, four-jointed (?); last segment small and nipple-like. First two segments with golden scales at the sides and beneath; the two last segments are covered with scales which are coppery or rose-purple according to the angle the light strikes them. The proboscis is long, swollen at the base; the scales are purple or coppery. Prothoracic lobes small, thickly covered with broad, flat, racquet-shaped scales of a creamy-yellow colour, with some light-brown bristles. Mesonotum black, thickly clad with spindle-shaped flat scales, which laterally become very broad and blunt-ended, and which in a good light appear of a brilliant metallic green to the naked eye in a fresh specimen. Under a lens the colour varies, peacock blue, bronzy purple, and metallic green appearing intermixed, now one colour predominating, now another, as the fly is shifted to different angles. On the anterior margin are some golden scales and numerous golden bristles, and laterally in front, immediately behind the prothoracic lobes, there is a band of metallic rose-purple scales, and beneath this is a triangular patch of creamy-yellow scales. The two patches meet in a straight line, but the external edges are convex; hence with the prothoracic lobe they form a rough ellipse. The upper band is to be seen when looking down upon the mesonotum and is very ornamental. The scutellum is clad with rather long, flat, spatulate scales, which are coppery, bronzy or purple bronze as the direction of the light varies. There is a tuft of bristles over the root of each wing. Scutellar bristles are brown in colour. The pleurae are dark, glistening chestnut brown, naked in parts, scaled in other parts with creamy-yellow scales. The wings are quite typical; the costa and first long vein are scaled with metallic rose-purple scales.

Legs with the coxae and femora light yellow. Tibiae and tarsals much darker; the coxae, bases and under surface of femora

clad with metallic golden scales; the upper and lateral surfaces of the femora and the whole tibia and tarsals of fore leg covered with brilliant metallic scales, varying from coppery-bronze to rose-purple or bronze-purple; there are creamy scales at the apices of all the femora; mid legs as the fore, except for a band of golden scales covering the penultimate tarsal segment; tibia and tarsals of hind legs the same as the fore. Ungues equal and simple. Metanotum black. Halteres with pale yellow stems and dark scaled knobs.

Abdomen with the first segment scaled creamy-yellow laterally, rose-purple centrally; the other segments brilliant rose-purple, with creamy-yellow banding expanding laterally into triangular patches; venter scaled with metallic golden scales, except segment four, which has a patch of dark purple scales.

Length.—10 mm.

♂. Head black, with a deep furrow in the centre; there is a large central patch of flat scales of a bronze-green or golden-green colour; the scales along the orbital margins are peacock-blue, laterally there is a patch of scales peacock-blue or rose-purple according to the light in which they are seen.

Antennae with basal segment black, nude; remaining segments creamy growing darker towards the apex; the second segment scaled with spatulate and elongated scales of a dark brown colour; a few scales show metallic colouring. There are numerous dark brown hairs on the segments; the verticillate hairs dark brown, almost black, neither very dense nor very long.

Palpi three-jointed; first segment shows a slight swelling at the base, and there is a thinning of the chitin which looks like a joint but is not; there is also a second thinning, and the chitin is folded in more basally; the whole segment is very long. The second segment is about half the length of the first; the third is long and pointed, almost as long as the first segment, which is almost entirely golden-scaled except on its upper surface near its base, where there is a patch of rose-purple scales, and a band of the same about its middle, and a few dark scales dorsally at the apex; the second segment golden-scaled beneath and also the sides, except apically; the upper surface is purple-scaled; the third segment is entirely purple-scaled.

Proboscis scaled with purple scales to the angle, then green-scaled. The markings of both proboscis and palpi vary. (In one specimen the first segment of the palpus is entirely gold-scaled except for a ring of purple scales on the middle and apex.)

Thorax similar to the female.

Legs with the coxae and under-sides of the femora golden-scaled. The upper surfaces of the femora and the rest of all the legs are clad with purple scales; a few pale scales are inserted at the apices of the femora; fore and mid ungues unequal, the larger uniserrated. Abdomen scaled as in the female. No caudal tuft. A few rather long golden hairs inserted on the two last segments.

Length.—10 mm.

Habitat.—Kuala Lumpur.

Observations.—The most striking features are the honey-yellow and purple male palpi, and the single creamy band on the mid legs of the female. Had this species been described from dry specimens sent me by Dr. Leicester, I should have described the abdomen as unbanded, for in the female no traces of bands can be seen as in the fresh specimens. It forms certainly a very distinct species, coming near *T. immisericors*, Walker.

ORTHORHYNCHAE.

METANOTOPSILAE-HETEROPALPAE.

Sub-Family **CULICINAE.** Theobald.

This is the largest sub-family and contains a number of diverse genera. They can easily be seen to belong to this group by the short ♀ palpi and long ♂ palpi. They most nearly approach the *Toxorhynchites* in this respect, but the longer first sub-marginal cell at once separates them.

Sixty-three genera are mentioned here. Some more have been added since this went to press.

TABLE OF GENERA.

I. Eyes and scutellum normal.
 A. Legs ornamented with dense outstanding scales.
 a. Head clothed with spindle-shaped and broad-curved scales.

ββ. Hind legs only densely scaled
Genus 1 JANTHINOSOMA. Arribalzaga.

ββ. All the legs more or less densely scaled.
Wings scales rather thin ...Genus 2 PSOROPHORA. Robineau-Desvoidy.
Wings scales large inflated, particoloured. Body and head with very long twisted scales ...Genus 3 MUCIDUS. Theobald.

αα. Head clothed with flat scales. Scutellum with flat scales.
Wings with dense scales apically. Hind legs of ♂ with scaly paddles
Genus 4 ERETMAPODITES. Theobald.

B. Legs normal, no irregular scales.

α. Head clothed with flat and upright forked scales only.

β. Scutellum with flat scales.
Some flat scales on the mesonotum before scutellum Genus 5 QUASISTEGOMYIA. Theobald.
No flat scales on mesonotum.
Male palpi long, thin, nude and acuminate. Large Genus 6 DESVOIDYA. Theobald.
Male palpi thin, acuminate or clavate, hairy. Small.....Genus 7 STEGOMYIA. Theobald.

ββ. Scutellum with narrow-curved scales
Palpi of ♂ acuminate.....Genus 8 PSEUDOSKUSEA. Theobald.
Palpi of ♂ clavate.....Genus 9 LUDLOWIA. n. g.

αα. Head clothed with mostly flat scales but also with small areas of narrow-curved scales and upright forked ones.

γ. Scutellum with all flat scales.

δ. Palpi of ♀ very short.
Head with median row of narrow-curved scales Genus 10 SCUTOMYIA. Theobald.
Head with narrow-curved scales behind Genus 11 ÆDIMORPHUS. Theobald.

δδ. Palpi of ♀ half length of proboscis.
Head with flat scales except for some spindle-shaped ones around the eyes ...Genus 12 LEICESTERIA. Theobald.

γγ. Scutellum with flat scales to mid lobe, narrow-curved ones to lateral lobes.
Head with flat scales, narrow-curved ones in median area
Genus 13 MACLEAYA. Theobald.
Head with all flat scales except for a median basal area
Genus 14 CARROLLIA. Lutz.

γγγ. Scutellum with flat scales on each lobe separated by narrow-curved ones, an apical border of narrow-curved scales Genus 15 POPEA. Ludlow.

γγγγ. Scutellum with flat and narrow-curved scales, none along apical border Genus 16 HOWARDINA. Theobald.

γγγγγ. Scutellum with large spindle-shaped scales..... Genus 17 HULECOETEOMYIA. Theobald.

γγγγγγ. Scutellum with small flat scales on mid lobe, narrow-curved ones on lateral lobes Genus 18 PHAGOMYIA. Theobald.

γγγγγγγ. Scutellum with spindle-shaped scales on mid lobe, flat ones on lateral lobes Genus 19 POLYLEPTIOMYIA. Theobald.

γγγγγγγγ. Scutellum with narrow-curved scales all over.

δ. Head with flat scales except for a median triangular narrow-curved scale area.....Genus 20 PSEUDOHOWARDINA. n. g.

δδ. Flat scales spread around the eyes Genus 21 CULICIOMYIA. n. g.

δδδ. Head with only a double row of narrow-curved median scales Genus 22 NEOMACLEAYA. n. g.

δδδδ. Head with all flat scales except along the nape.....Genus 23 DANIELSIA. Theobald.

δδδδδ. Head with narrow-curved scales around the eyes.....Genus 24 LEPIDOTOMYIA. Theobald.

δδδδδδ. Head with narrow-curved scales behind Genus 25 GNOPHODEOMYIA. Theobald.

aaa. Head clothed with mostly narrow-curved scales and upright forked ones, flat only at the sides as in *Culex*.

Scutellum with flat median and narrow-curved lateral scales..... Genus 26 PROTOMACLEAYA. n. g.

Scutellum with all flat scales Genus 27 REEDOMYIA. Ludlow.

Scutellum with mixed narrow-curved and small flat scales to mid lobe, long, flat and narrow-curved ones to lateral lobes Genus 28 PECOMYIA. Theobald.

aaaa. Head with loose irregular flat scales and narrow-curved ones behind.

Scutellum with flat median scales and narrow-curved lateral ones Genus 29 CATAGEIOMYIA. Theobald.

aaaaa. Head with broad flat spindle-shaped scales. Scutellum with small flat scales.

Vein scales of *Taeniorhynchus* type Genus 30 GILESIA. Theobald.

Antennae densely hairy Genus 31 TRICHORHYNCHUS. Theobald.

aaaaaa. Head with broad narrow-curved scales; scutellum with flat scales; ♂ palpi clavate, wings spotted ... Genus 32 PSEUDOTHEOBALDIA. n. g.

Scutellum with broad spindle-shaped scales Genus 33 MAILLOTIA. n. g.

aaaaaaa. Head and scutellar scales narrow-curved only, except at the sides of the head where they are flat.

δ. Abdomen clothed with flat scales only.

I. Legs uniform, femora not enlarged at all.

Palpi of ♂ clavate. Wings with lanceolate scales united into spots Genus 34 THEOBALDIA. Neveu-Lemaire.

Wing scales scanty; wing membrane stained Genus 35 PARDOMYIA. n. g.

Wing scales pear-shaped and spatulate; fork-cells short ... Genus 36 MEGACULEX. n. g.

Wings with rather thick median scales and short broadish lateral ones. Fork-cells small; scales mottled.

Head with broad narrow-curved scales and forked ones.

Scutellum with narrow-curved scales Genus 37 GRABHAMIA. Theobald.

With mostly small flat scales on the scutellum, a few narrow-curved ones on posterior border of mid lobe Genus 38 PSEUDOGRABHAMIA. Theobald.

Head with irregular flat scales dotted all over giving a ragged appearance Genus 39 ACARTOMYIA. Theobald.

Posterior cross-vein slopes prominently in basal direction, and median vein scales large and spatulate Genus 40 APOROCULEX. n. g.

Palpi of ♂ acuminate. Wings ornamented with various coloured patches. Scales partly *Culex*-like partly *Taeniorhynchus*-like.....Genus 41 LUTZIA. Theobald.

Wings with dense linear scales; fork cells short Genus 42 CULICADA. Felt.

Wings with broadish lateral vein scales, median large and spatulate. Front area of thorax silvery-grey scaled...Genus 43 LEUCOMYIA. n. g.

Fork cells short, but vein scales broader than in *Culex* Genus 44 CULICELSA. Felt.

Wings with narrow linear or lanceolate scales.

Fork cells long in the ♀. Costa not spinose Genus 45 CULEX. Linnæus.

Costa spinose; ♂ palpi bluntly acuminate Genus 46 MICROCULEX. n. g.

Wing scales broader than in *Culex*; ♂ palpi plumose Genus 47 PROTOCULEX. Felt.

Male antennae with special organs Genus 48 LOPHOCERATOMYIA. Theobald.

Proboscis hairy in the middle... Genus 49 TRICHOPRONOMYIA. Theobald.

Wings with elongated broadish scales. Fork-cells long..... Brown species.....Genus 50 TAENIORHYNCHUS. Arribalzaga.

Golden, yellow and purple species Genus 51 CHRYSOCONOPS. Goeldi.

Wings with large broad and asymmetrical scales. Scutellar scales narrow-curved Genus 52 MANSONIA. Blanchard.

Scutellar scales flat ...Genus 53 MANSONIOIDES. n. g.

Wing scales large and fan-shaped Genus 54 LEPIDOPLATYS. Coquillett.

Wing scales heart-shaped..... Genus 55 ETORLEPTIOMYIA. Theobald.

II. Femora and tibiae swollen apically and basally.

Wing scales small, dense and broad at the apices of the veins. Small black gnats..... Genus 56 MELANOCONION. Theobald.

Wing scales longer and *Taeniorhynchus*-like.....Genus 57 NEOMELANOCONION. n. g.

ßß. Abdomen with large flat projecting lateral scales, with deeply dentate apices, in more or less dense tufts.
Wing scales of *Culex* type
Genus 58 LASIOCONOPS. Theobald.

ßßß. Abdomen with scaly ventral tufts.
Wing scales pyriform, dense and mottled.....Genus 59 FINLAYA. Theobald.
Scutellum nude except for two lines of scales.
Head with small flat scales, with a median line of narrow-curved ones.
Thorax mostly nude; scales on scutellum long and thin
Genus 60 BANCROFTIA. Lutz.
Head with broad, short curved scales, those at sides broader and flatter but not spatulate; scutellar scales broadish
Genus 61 PNEUMACULEX. Dyar.

II. Eyes very large, completely fused in middle line Genus 62 OCULEOMYIA. n. g.

III. Eyes small; scutellum with a large backwardly projecting process
Genus 63 RACHIONOTOMYIA. Theobald.

GENUS **JANTHINOSOMA.** Arribalzaga.

Conchyliastes. Morgan, Howard and Coquillett.*

Dipt. Argentina, p. 52 (1891), Arribalzaga; Mono. Culicid. I., p. 253 (1901), and III., p. 124 (1903), Theobald; Handbk. Gnats, 2nd ed., p. 337 (1902), Giles; Gen. Ins. Fam. Culic., p. 16 (1905); Les Moust., p. 231 (1905), Blanchard; Class. Mosq. North and Mid America, Tech. Se. 11, U.S. Dept. Agri., p. 17 (1906), Coquillett.

SYNOPTIC TABLE OF SPECIES.

I. Last two hind tarsals white.
Head honey yellow.
Thorax with scattered yellow and bronze scales *sayi.* nov. nom.
(*musica.* Say.)

* This was a temporary MS. name used, but never definitely, as the genus was identified with *Janthinosoma.* The MS. name was printed on Plate B of the Atlas of Plates, and escaped observation before the plate had been set (spelt *Conchyliates*).

Head not honey yellow.
Thorax with a broad yellow scaled area on each side *lutzii.* Theobald.
Thorax with creamy lateral scales *albipes.* nov. nom.
Thorax wholly yellow-scaled *coquillettii.* n. sp.*
II. Last hind tarsal white.
Thorax with scattered bronzy and yellow scales *posticata.* Wiedemann.
III. Last hind tarsal dark.
Fourth tarsal with a white basal band.
Thorax with median bronzy scales and orange-yellow lateral ones..... *discrucians.* Walker.
Thorax yellow *varipes.* Coquillett.

Coquillett has added a new species since the last volume, and a new variety is described here.

The male type of Walker's *discrucians* has the last two hind tarsi white, but in his description he expressly states that there is only a sub-apical pale band.

The specimens identified by me as *discrucians* from the presumed type, and described in Vol. III., p. 127, are evidently not Walker's species, and I have thus given it a new name—*albipes.* Coquillett sinks it as a synonym of *lutzii*, Theobald, but the two are quite distinct.

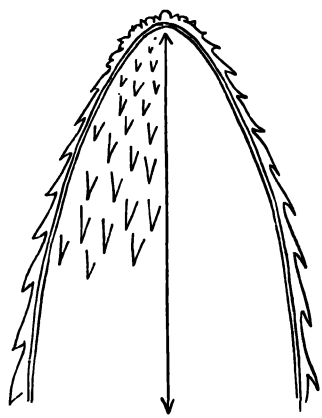


Fig. 40
End of ovum of *Janthinosoma lutzii.* Theobald (after Goeldi).

The latter observer has created some confusion by sinking Say's *musica* as a synonym of Wiedemann's *posticata*: the two are quite distinct. For *posticata* of Wiedemann he proposed a new name, *terminalis*, Coquillett,

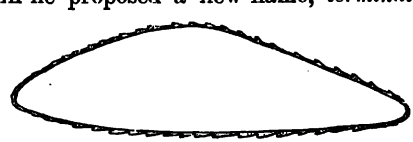


Fig. 41.
Ovum of *Janthinosoma sayi.* Theobald (after Goeldi).

which must therefore sink as a synonym of *posticata.* Unfortunately the name of the commonest species (*musicus*, Say) must

* This will be described later.

sink, as the name was used two years previously by Leach (1825). I propose to call Say's *musicus—sayi*, after the describer.

JANTHINOSOMA POSTICATA. Wiedemann (non Coquillett) (1821).

Culex posticatus. Wiedemann (1821).

Janthinosoma terminalis. Coquillett (1906).

Mem. de la Soc. d'Hist. Nat. de Paris, p. 410 (1827), Robineau Desvoidy; Bull. no. 4 (N. S.) U.S. Dep. Agri. Div. Ent., p. 22 (1896), Howard; Handbk. Gnats, p. 278 (1900), Giles; Dipt. Exot. I., 43, 2 (1821), Wiedemann; Auss. Zweif. Ins., p. 9 (1828); Mono. Culicid. I., p. 253 (1901), and III., p. 125 (1903), Theobald; Les Moust., p. 233 (1905), Blanchard.

Coquillett makes Wiedemann's species to have the last two hind tarsals white. Wiedmann only says, "apices of the posterior tarsi clear white." The species which he refers to as *posticata*, with a wholly yellow-scaled thorax, is thus new, and I propose to call it *coquillettii*, his *terminalis* sinking as a synonym.

JANTHINOSOMA VARIPES. Coquillett (1903).

Conchyliastes varipes. Coquillett (1903).

Janthinosoma johnstonii. Grabham (1905).

Canad. Entomo., p. 10 (1903); Class. Mosq. N. and M. America Tech. Sc. 11, U.S. Dept. Agri., p. 17 (1906), Coquillett.

This insect is so near *Janthinosoma sayi* that it may easily be confused, but the last segment of the hind tarsus is brown, not white.

Coquillett's original description is as follows:—

"Black, front and hind femora except their broad apices, the posterior side of the middle femora except their apices, and the stems of the halteres, yellow, the fourth segment of hind tarsi white; scales of palpi violaceous, those of the occiput yellowish white and with a patch of violaceous ones on either side (mesonotum abraded; what scales remain are yellowish white and a few black ones along the middle); scales of abdomen violet blue, those on sides of first two segments, hind angles of the others except the last one, under surface of each segment except the last one and base of the preceding, whitish; scales on yellow portion of femora yellowish-white, those on the remainder and on tibiae violet blue, those on the tarsals black except on the fourth segment of hind tarsi, where they are white, claws of front tarsals toothed; wings greyish hyaline, veins and scales

brown, petiole of first sub-marginal cell from two-fifths to three-fifths as long as that cell, hind cross-vein less than its length from the small; length, 4 mm. Las Penas and Ionala, Mexico (Dr. A. Dugès) and Agricultural College (Mississippi) (May 18, Glenn W. Herrick)."

Note.—Coquillett makes Grabham's *johnstonii* from Jamaica a synonym of his *varipes*. I have not seen the description of this species.

JANTHINOSOMA SAYI. nov. nom.

Janthinosoma musica. Say (1827). (Non Leach) (1825).

Culex musicus. Say (1827).

Janthinosoma mexicanus. Blanchard (non Bellardi).

Culex posticatum. Coquillett (non Wiedemann).

Journ. Acad. Nat. Sc. Phil. VI., p. 149 (1827), Say; Mono. Culicid. I., p. 255 (1901); III., pp. 124 and 126 (1903), Theobald; Handbk. Gnats, p. 276 (1900), and 2nd ed., p. 340 (1902), Giles; Mosq. N. Jersey, p. 180 (1905), Smith; Les Moustiques, p. 234 (1905), Blanchard (*mexicanus*); Class Mosq. N. and M. America, Tech. Sc. 11, p. 17 (1906), Coquillett.

Additional localities.—New Jersey (but not yet found below red shale belt), (Prof. J. B. Smith); Arrayollos, Paranaguara, Brazil, in April and May (Dr. Goeldi); Augusta Arsenal and Fort Oglesthorpe; Fort Brown, Texas; Jackson Barracks and Fort St. Philip, Louisiana; Fort Logan, Arkansas; Fort Leavenworth, Kansas (Miss Ludlow); São Paulo, Bahia, and generally common in the Brazils (Drs. Lutz and Goeldi); Mississippi (Prof. Glenn Herrick).

Further Observations on habits, etc.—In New Jersey this persistent biter appears at the end of June, through July and August, and a few as late as September.

The eggs were first observed as previously reported (Vol. III., p. 124, 1903) by Professor Morgan, and much further detail has been added by Dr. Goeldi.

The larvae occur in woodland pools in New Jersey. The first were taken on June 20th, and adults hatched out on July 2nd and 3rd. Larvae were found again July 15th and many as late as September 30th, pupation beginning on October 1st, adults appearing October 4th. In New Jersey Smith tells us the development is rapid in summer, becoming slower in autumn.

The Larva.—The following details of the larva are taken from Smith's Report: Length, 7–8 mm.; slaty-grey to blackish in colour; young and half-grown specimens pale grey or whitish, head pale yellow and immaculate; antennae long and slender, curved, surface with many broad spines, with prolonged bases, giving the organs a scaled appearance, lateral tuft of six to eight hairs, medianally placed; apex with three long spines, one very small one and a small joint; mentum broadly triangular, a large apical

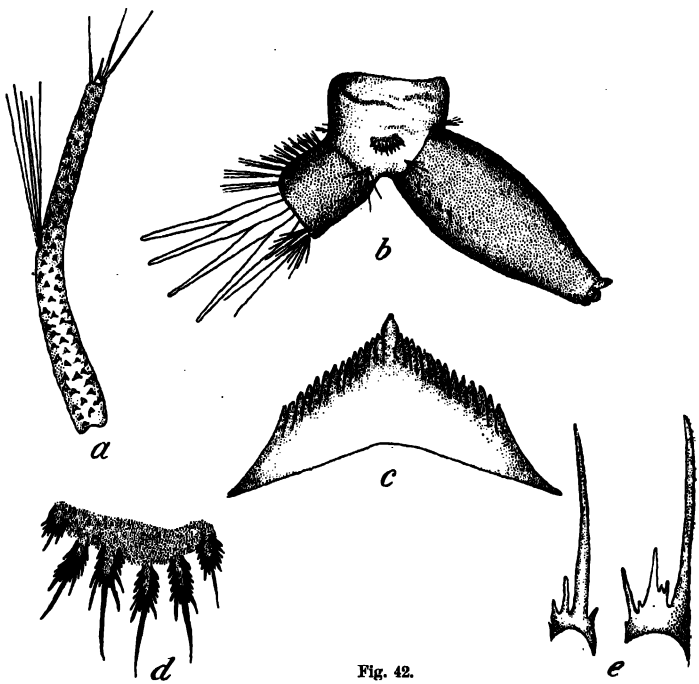


Fig. 42.

Larval characters of *Janthinosoma sayi.* nov. nom.
a, antenna; b, siphon; c, labial plate; d, comb scales; e, pecten scales (after Felt).

tooth, 13–15 on each side of it; combs of eighth segment forming a fringe of 6–8 scales, each with a long apical spine and short lateral ones; pectens of siphon with 3–4 spines only, each with a broad base from which spring either on one or both sides teeth of varied length; anal gills long and thin, more than twice as long as the anal segment.

Synonomy.—Coquillett makes Say's *musicus* the same as Wiedemann's *posticatus.*

The latter species has the last hind tarsal white. The former Say expressly states has the two last joints white.

The specimens I re-described of *posticata* (p. 253, Vol. I.) answer exactly to Wiedemann's description, and *musicus* of Say is seen to be totally distinct. Unfortunately Say's name, *musicus* (1827), was used in 1825 by Leach for a *Culex*, and thus does not stand. I have thus renamed the insect after its describer.

Blanchard called it *mexicanus*, Bellardi, but Bellardi's species has the last hind tarsus white, and might be *posticatus*.

Coquillett however identifies *mexicanus* as a distinct species, and places it in a new genus, *Lepidosia*.

JANTHINOSOMA SAYI.

Variety *jamaicensis*. n. v.

A series of five ♀'s taken by Lord Walsingham exactly resemble the typical *sayi*, but in all the specimens the last two hind tarsals only are white, the white not spreading at all on to the apex of the second tarsal segment, as seen in *sayi*.

Habitat.—Runaway Bay (Lord Walsingham); Kingston, Jamaica (Dr. Grabham).

Time of capture.—April and July.

Note.—It is possibly a distinct species.

JANTHINOSOMA ALBIPES. nov. nom.

Janthinosoma discrucians. Theobald (non Walker).

Mono. Culicid. III., p. 126 (1903), Theobald; Les Moustiques, p. 232 (1905), Blanchard; Class. Mosq. N. and M. Amer. Tech. Se. 11, U.S. Dept. Agri., p. 17 (1906), Coquillett.

This proves to be a new species and not *discrucians*, Walker, a mistake having arisen owing to the type (♂) not agreeing with Walker's description.

Additional localities.—Fort Logan, H. Roots, Arkansas (Miss Ludlow).

Coquillett would sink this as a synonym of *J. lutzii*, Theobald, but the latter is quite distinct, having a different ornate thorax and the apex of the second hind tarsal also white.

JANTHINOSOMA LUTZII. Theobald (1901).

Culex albitarsis. Neveu-Lemaire (non Theobald) (1902).

Mono. Culicid. I., p. 257 (1901) and III., p. 128 (1903); Archives de Parasitologie, VI., p. 10 (1902) (*albitarsis*), Neveu-Lemaire; Handbk. Gnats, 2nd ed., p. 339 (1902), Giles; Les Moustiques, p. 236 (1905), Blanchard.

Additional localities.—Prainbra, Brazil (Dr. Goeldi), in May.

Synonomy.—It is evident that the species taken by Neveu-Lemaire to be the African *Culex albitarsis*, Theob., is only this species.

JANTHINOSOMA DISCRUCIANS. Walker (non Theobald) (1856).

Janthinosoma arribalzagae. Giles (1902).

Insecta Saundesiana, p. 430 (1856), Walker; Dipt. Argent., p. 53 (1891), Arribalzaga; Handbk Gnats, p. 341, 2nd ed. (1902); Class. Mosq. N. and M. America, Tech. Se. 11, p. 17 (1906), Coquillett.

Additional localities.—Fort Logan, H. Roots, Arkansas (Miss Ludlow); São Paulo (Dr. Lutz), Rio de Janeiro.

Notes.—Walker's description does not agree with the types in the Museum. The male has the last two tarsals white; the female has no hind legs. It is possible the male is not the original specimen. Taking the description as valid, the specimens taken as *discrucians* by myself and re-described in Vol. III., p. 126, are not Walker's species, as he expressly states that the last hind tarsal is white only at the base.

Giles' *J. arribalzagae* answers this description, and must therefore sink as a synonym. The species I re-described as Walker's is now given a new name, *albipes* (*vide* table).

GENUS **PSOROPHORA.** Robineau-Desvoidy.

Essai, s. l. tribu d. Culic. Mem. d. l. Soc. d'Hist. Nat. d. Paris, III., p. 412 (1827), Robineau-Desvoidy; Dipt. Argent. Rev. d. Mus. de La Plata, II., p. 138 (1891), Arribalzaga; Handbk. Gnats, p. 178 (1900), 2nd ed., p. 343 (1902), Giles; Mono. Culicid. I., p. 259 (1901); III., p. 130 (1903), Theobald; Les Moustiques, p. 237 (1905), Blanchard; Gen. Ins. Fam. Culicid., p. 16 (1905), Theobald; Class Mosq. N. and Mid America, Tec. Se. 11, U.S. Dep. Agri. Div. Ent., p. 14 (1906), Coquillett.

No new species have been added to this genus since 1903. It is still limited to the Americas. Since the appearance of the

last volume, the life-history of *Psorophora ciliata*, Fabr., has been worked out by several observers. It is incorporated here under the name of that species.

Several naturalists still confuse this genus with *Mucidus*. If they examine the scale ornamentation, they can be separated at once. No *Mucidus* has yet been found outside Africa and Asia.

Coquillett has wrongly referred *fulvus*, Wiedemann, to this genus. Coquillett has also identified Fabricius' *ciliipes* as a *Psorophora*.

PSOROPHORA CILIATA. Fabricius (1794).

Culex ciliatus. Fabricius (1794).
Culex molestus. Wiedemann (1821).
Culex rubidus. Desvoidy (1827).
Culex boscii. Desvoidy (1827).
Culex pertenens. Walker (1856).
Culex conterrens. Walker (1856).

Ent. Syst. IV., p. 401, 6 (1794); Syst. Antl., p. 35, 10 (1805), Fabricius; Dipt. Exoti., p. 36 (1821); Ausseurop. Zweif. Ins. I., p. 3 (1828), Wiedemann; Essai sur la Tri. d. Culicid., p. 413, 1, 2 and 3 (1827), Robineau-Desvoidy; Hist. Nat. d. Ins. Dipt. 1, p. 36 (1834); Dipt. Exot. non. o. per con. IV., 4 Sup. (1850), Macquart; Cat. Dipt. Brit. Mus., p. 2 (1848); Ins. Saund., p. 427 and 431 (1856), Walker; Dipt. Argent. II., p. 140 (1891), Arribalzaga; Bull, 4, n. s., U.S. Dept. Agri., p. 23 (1896); Canad. Entomo. XXXII., pp. 353–357 (1900), Howard; Hndbk. Mosq., p. 179, 1 (1900), and 2nd ed., p. 345, 1 (1902), Giles; Mono. Culicid. I., p. 261 (1901), and III., p. 130 (1903), Theobald; Les Moust., p. 239 (1905), Blanchard; Mosq. N. Jersey, p. 173 (1905), Smith.

Additional localities.—Distributed throughout New Jersey, U.S.A., but usually rare (Prof. J. B. Smith); Baltimore, Maryland; Fort Hancock, New Jersey; Fort Hunt, Virginia; Fort Morgan, Alabama; Rock Is. Arsenal, Illinois; Fort Screven, Georgia; Fort Wadsworth, New York (Miss Ludlow); Biloxi, Mississippi (Prof. Glenn Herrick).

Observations on habits, etc.—In New Jersey this large mosquito occurs from June to early October. The bite is not very poisonous, but it bites through clothing, even "coat, vest, and two shirts to the skin." Smith records that it prefers horses to man. It may occur indoors. Its flight is heavy and slow.

Life-history.—The eggs are laid at the edge of a pool or a moist depression, and remain dormant until covered with water. There are indications that blood food is necessary for development of the ova. The larvae feed on other mosquito larvae and may become cannibal. In this way it does much good, and



Fig. 43.
Larval mandible of *Psorophora ciliata* (after Felt).

Smith states that "its rank as a pest is not sufficiently high to counterbalance the benefits received from it."

The larvae occur only in temporary pools or pools recently dried out. Those in or at the borders of woodlands are most



Fig. 44.
Comb of *Psorophora ciliata* (after Felt).

chosen by them, but they also occur in the open. They may be found in New Jersey from June to August.

The larva is 10–15 mm. long; colour pale grey to dark grey, head pale brown blotched with dark brown; antennae yellowish,

rather long and slender, apex with two spines and a small segment, just below a long and a short spine; a single spine towards apex represents the lateral tuft, and there are a few (short) spines towards the base on one side; labial plate very broad and short,

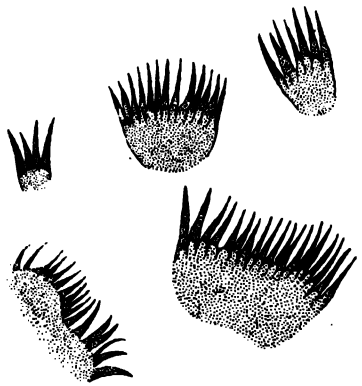


Fig. 45.
Comb scales of *Psorophora ciliata* (after Felt).

a large apical tooth, 7–9 teeth on each side; comb of eighth segment consists of a large patch of minute scales edged with a single row of 10–16 large scales, each with a large apical spine and two to four smaller lateral ones; 20–30 spines on each

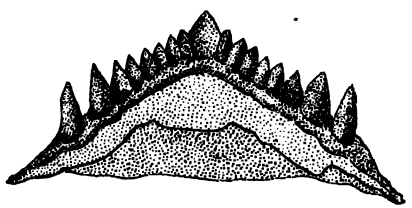


Fig. 46.
Labial plate of *Psorophora ciliata* (after Felt.)

lateral row of siphon, the spines long and thin with one or two small basal teeth; anal gills long, from $3\frac{1}{2}$ to 4 times as long as the anal segment.

Synonomy.—Coquillett makes *Culex rubidus*, Desvoidy, a synonym of this species.

PSOROPHORA SCINTILLANS. Walker (1848).

Dip. Mus. List. Dipt. I., p. 1 (1848); Handbk. Gnats, p. 185 (1900), Giles, and 2nd ed., p. 346 (1902), Giles; Mono. Culicid. I., p. 265 (1901), and III., p. 130 (1903), Theobald; Les Moustiques, p. 241 (1905), Blanchard.

Additional locality.—Fort Reno, Okla (Miss Ludlow).

PSOROPHORA HOWARDII. Coquillett (1902).

Canad. Entomo., p. 258 (1902); Mono. Culicid. III., p. 131 (1903), Theobald.

Additional localities.—Mississippi State (Professor Glenn Herrick); Fort Hunt, Virginia; Fort Leavenworth, Kansas (Miss Ludlow).

PSOROPHORA CILIPES. Fabricius (1805)

Culex cilipes. Fabricius.

Syst. Antl., p. 34, 3 (1805), Fabricius; Dipt. Exotica., p. 8 (1821), and Auss. Zweiflug. Insek. I., p. 5, 7 (1828), Wiedemann; Mém. d. l. Soc. d'hist. nat. d. Paris, III., p. 404 (1827), Robineau-Desvoidy; Class. Mosq. N. and M. America, Tech. Se. II., p. 17, U. S. Dept. Agri. (1906), Coquillett.

Coquillett has identified Fabricius' *cilipes* as a *Psorophora*. It differs from his *howardii*, Coq., in that the front and other femora are yellow, and yellow scaled, their broad apices black scaled.

GENUS **MUCIDUS.** Theobald.

Mono. Culicid. I., p. 268 (1901), and III., p. 132 (1903), Theobald; Gen. Ins. Fam. Culicidae, p. 17 (1905), Theobald; Les Moustiques, p. 243 (1905), Blanchard.

No new species have been found.

MUCIDUS ALTERNANS. Westwood (1835).

Culex alternans. Westwood (1835).

Culex commovens. Walker (1848).

Culex hispidosus. Skuse (1889).

Ann. Soc. Ent. France, IV., p. 681 (1835); Trans. Ent. Soc. Lond. III., p. 384, Westwood; Ins. Saund. Dipt., p. 432 (1848), Walker; Trans. Linn. Soc. N. S. Wales, p. 1726 (1889), Skuse; Mono. Culicid. I., p. 269 (1901), Theobald; Les Moustiques, p. 243 (1905), Blanchard.

Dr. Bancroft informs me this species oviposits singly. No other fresh notes have been made, but the life-history has been

further worked out (Proc. Soc. Queensland, pp. 67–80, pls. iii. vii., Colledge).

MUCIDUS AFRICANUS. Theobald.

Mono. Culicid. I., p. 274 (1901), and III., p. 134 (1903), Theobald; Handbk. Gnats, 2nd ed., p. 349 (1902); Les Moustiques, p. 245 (1905), Blanchard.

Additional localities.—Transvaal (C. B. Simpson); Natal (C. Fuller).

GENUS **DESVOIDYA.** Blanchard.

nov. nom for ARMIGERES. Theobald.

(non *Armiger.* Hartmann.)

Mono. Culicid. I., p. 322 (1901), and III., p. 383 (1903), Theobald; Handbk. Gnats, 2nd ed., p. 384 (1902), Giles; C. R. de la Soc. de Biologie, LIII., p. 1045 (1901), Blanchard; Les Moustiques, p. 265 (1905), Blanchard; Gen. Ins. Fam. Culicid., p. 17 (1905), Theobald.

No new species have been found, but Miss Ludlow has described a new variety of *fusca*—which seems to me to deserve specific rank.

The species tabulate as below :—

Thorax uniformly bronzy-brown in the middle, pale at sides.
 Scutellum with pale scales at the sides, dark in middle *obturbans.* Walker.
 Scutellum all dark scaled *fusca.* Theobald.
Thorax elaborately adorned *panalectros.* Giles.
Thorax with a short median white line running from scutellum to level of the wing roots..... *joloensis.* Ludlow.

DESVOIDYA OBTURBANS. Walker (1860).

Culex obturbans. Walker (1860).

Culex ventralis. Walker (1865).

Proc. Linn. Soc. Lond. IV., p. 91 (1860); Proc. Linn. Soc. Zool. V., p. 144 (1861), Walker; ibidem, p. 229 (1861); ibidem, VII., p. 202 (1864); VIII., p. 103 (1865) (= *ventralis*), Walker; Handbk. Gnats, pp. 338, 339 (1901); 2nd ed., p. 385 (1901), Giles; Mono. Culicid. I., p. 323 (1901); Proc. Roy. Soc. LXIX., p. 384 (1902), Theobald; Mono. Culicid. III., p. 138 (1903), Theobald; Les Moust., p. 266 (1905), Blanchard.

New locality.—Philippine Islands (Miss Ludlow). "Bred from large larvae from under overhanging rock, in a deep pool of a

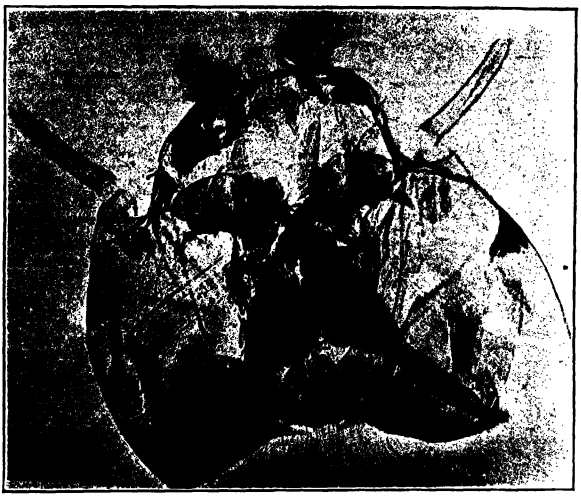


Fig. 47.
Head of larval *Desvoidya obturbans.* Walker.



Fig. 48.
Siphon of larva of *Desvoidya obturbans.* Walker

clear running stream. Larvae resemble overgrown *Anopheline* larvae and are very cannibalistic."

DESVOIDYA FUSCA. Theobald (1903).

Mono. Culicid. III., p. 135 (1903), Theobald.

New locality.—Philippine Islands (Miss Ludlow). "Bred from larvae taken from water-filled joints of bamboo poles in a fence" (Dr. Whitmore).

DESVOIDYA FUSCA. Theobald.

Var. *joloensis.* Ludlow (1904).

Canad. Entomo. Vol. XXXVI, p. 236 (1904).

Differs from the type in having on the mesothorax a short median line of white, beginning at the scutellum, tapering as it runs to the head and ending just cephalad of a line drawn perpendicular to the wing joint. Mid lobe of scutellum also white.

Twenty-three ♂'s and ♀'s taken at Jolo, Philippine Islands, in 1903.

It seems to me that this insect deserves specific rank.

GENUS **QUASISTEGOMYIA.** Theobald.

Sec. Rept. Gord. Coll., Well. Labs., p. 69 (1906).

Head clothed with flat scales; palpi short and spatulate in the ♀; clypeus with a distinct carina and lateral prominences. Second segment of the antennae much larger than the following ones. Mesothorax with narrow-curved scales of two sizes and with two pronounced areas of *flat scales before the scutellum*, one on each side of the bare area in front of it; scutellum with flat scales.

Abdomen and legs normal,

Wings densely scaled with long straight rather broad linear scales and short broad flat median ones; the branches of the fifth long vein nearly as long as the stem; the fringe long, the median sized scales apparently all crossing the large ones: costal border spiny.

The ♀ palpi are apparently of three segments, the basal one very small, the second smaller than the third, which is as long as the rest of the palp, swelling apically, the apex truncated, on

the inner side are two slight notches. In *Stegomyia* they are the same size apically, tapering to an abrupt acute apex.

This genus comes close to *Stegomyia*, but differs in (i) the marked flat scales on the mesonotum, (ii) the wing scales, and (iii) in the peculiar ♀ palpi, and also in (iv) the swollen second antennal segment. The only example yet found occurs in the Sudan.

QUASISTEGOMYIA UNILINEATA. Theobald (1906).

Sec. Rept. Gord. Coll., Well. Labs., p. 70 (1906).

Head black with a median white line; palpi black with white apex; proboscis black. Thorax deep brownish-black with a median white line, divided by a very narrow dark line, which extends about half the length of the mesothorax, two small white spots where it ends and a white patch in front of the roots of the wings, also a few white scales before the white-scaled scutellum. Abdomen black with traces of narrow white basal bands and large white basal lateral spots. Legs black, base of femora white and with some of the segments with basal white bands. Wings brown scaled.

♀. Head black, clothed with flat black scales with a broad median area of flat white ones about three and four scales wide, a few snow-white small flat scales projecting between the eyes, bristles black.

Clypeus black, with a distinct ridge which ends in a lateral prominence on each side, nude; proboscis deep black; palpi black-scaled with snow-white apical scales, swollen apically; antennae black, basal segment black with a patch of snow-white scales on the inside.

Thorax black, clothed with deep bronzy-brown narrow-curved scales, ornamented with a median line of narrow-curved white scales almost hair-like, with a very narrow bare line in the middle showing as a narrow dark line; this extends about half across the mesonotum; just behind where it ends are two small white-scaled spots, one on each side; over and in front of the roots of the wings is a patch of broader snowy-white scales, behind, bordering the sides and overlapping the bare space in front of the scutellum, numerous irregularly placed broadish narrow-curved scales, and on each side of them near the scutellum a large patch of *flat* black scales; the whole mesonotum very bristly, the chaetae large and black; scutellum

ochreous with flat white scales and with a few (3 ?) black border-bristles to the mid lobe; metanotum dusky black; pleurae dark brown with flat white scales.

Abdomen black with dusky black scales, each segment with more or less a narrow band of white scales which are more pronounced laterally; there are also very prominent large white basal lateral patches, separated from the abdominal bands; posterior border-bristles small, very pale golden.

Legs black, bases and under surface of femora grey to white; first, second and third tarsals of all the legs basally banded with white, in the fore legs the banding of the second tarsal almost imperceptible (last tarsal of hind legs absent). Ungues equal (simple ?). Wings rather densely scaled with long lateral rather broad scales and with short broad median ones, first sub-marginal cell longer, but scarcely any narrower than the second posterior cell, its base about level with that of the second posterior cell,



Fig. 49.
Wing of *Quasistegomyia unilineata*. ♀. Theobald.

its stem about two-thirds the length of the cell, stem of the second posterior cell nearly as long as the cell; posterior cross-vein sloping towards the base of the wing about three times its own length distant from the mid cross-vein; the branches of the fifth long vein very long, the cell being nearly as long as the stem; fringe long and dense, especially at the apex, where the scales are broad and sword shaped; the median-sized fringe scales slope across the long ones.

Length.—3·5 mm.

Habitat.—Sudan (Major Bray).

Time of appearance.—September (5.9.05).

Observations.—In general appearance this species is just like the *Stegomyia scutellaris* of Walker. It was nearly placed on one side as such, but luckily the flat scales on the mesonotum at the sides of the bare space in front of the scutellum were noticed. The median silvery line also shows a central dark thin line not

seen in the Eastern species, nor are there the two small thoracic spots. There are also marked peculiarities in the wings, palpi and antennae, so that it must clearly be placed in a new genus. The specimen bears a note "bred from a tree," presumably from a larva taken in a hollow tree. It is said to be a very irritating species.

The hind legs were too damaged to describe. The specimen was collected by Major Bray and sent me by Dr. Andrew Balfour.

Stegomyia scutellaris, Walker, is also a tree breeder.

QUASISTEGOMYIA GARDNERII. Ludlow (1905).

Stegomyia gardnerii. Ludlow.

Canad. Entomo. Vol. XXXVII., p. 99 (1905).

Thorax brown, with dark brown median scaled area, a few white scales near head, and a broad white lateral stripe extending about one-half the length of the mesonotum, a large white spot in front of base of wings, caudal half of mesonotum with a short median line of fine white or yellowish scales, and a short one (indistinct) on each side just in front of scutellum; scutellum brown with white border. Abdomen brown, with white basal lateral spots and four white dorsal basal spots. Legs brown, with basal white spots on some of the tarsal segments.

"♀. Head densely covered with broad flat brown and white scales. A very broad median white stripe from occiput to vertex, with a dark brown somewhat triangular spot on either side, bordered by white and followed laterally by a brown and then a white stripe; very few or no forked scales; antennae dark brown, verticels and pubescence dark brown, basal segment dark brown, heavily covered with flat white scales; palpi dark brown with brilliant white tips; proboscis brown, eyes brown, and a white rim around them made of smaller, perhaps spindle-shaped, but not true curved scales.

Thorax: prothoracic lobes brown with flat white scales; mesonotum brown covered densely on the median portion, so as to occupy about one-third the width of the mesonotum, with dark brown spindle-shaped scales, a few curved white scales on the cephalic edge and lateral, a broad white stripe extending about one half the length of the mesonotum, brown scales exterior to this; a large white spot in front of the wing joint, the caudal half of mesonotum dark brown with a short median line of fine white or yellowish scales, and a short indefinite line on each side, just in front of the scutellum, and here the scales become very long, curved and spatulate flat scales, so they fringe out over the scutellum. Scutellum brown, covered with long flat spatulate scales; brown scaled at the base,

with a broad white border on the apical edge; pleurae brown, with heavy bunches of white scales; metanotum brown.

Abdomen heavily covered with rather large flat brown iridescent scales, white basal lateral spots of varying size on most of the segments and four white dorsal basal spots—one on the penultimate—is lacking on the antepenultimate and present on the three segments cephalad to this. Ventrally there are heavy white basal spots, so that the venter is at least half white.

Legs: coxae and trochanters light brown, white scaled; fore femora white scaled ventrally, otherwise dark brown, iridescent scales, metatarsi brown, with very small basal white spot; first tarsal segment brown with small basal white spot; second, third, and fourth segments brown; ungues small, equal and uniserrate; mid femora dark brown with a few white scales at the base, a snow white spot midway on the cephalic aspect, and a white spot near the apex, which under the hand lens looks like a knee spot, but the very apex is brown; tibiae brown; metatarsi brown, with a small basal white spot, a little larger than those on the fore legs; first tarsal segment with small basal white spot, other segments brown; hind femora white scaled ventrally and dorsally, except a large brown dorsal spot near the apex, which however leaves the apex white; tibiae brown; metatarsi brown, with basal white spot; all tarsal segments brown, with large basal white spots so wide as almost to include the whole segment on the distal segments, but not always marked on the ventral side.

Wings clear, with brown scales, the median scales large, broadly truncate and the lateral, which are about twice as long, are comparatively slender and also truncate; the ventral scales more slender; first submarginal cell about one-third longer than and the same width as the second posterior; supernumerary cross-vein equals the mid, which it meets, and the posterior cross-vein is a little longer than the mid and about twice its own length distant; halteres with light stem and dark knob.

Length.—About 5 mm.

♂. In general the male differs little from the female; palpi slender, longer than the proboscis, brown, a small white spot at the base of the ultimate, a slightly larger one at the base of penultimate, a band at base of the antepenultimate segments, and another white spot nearly as wide as the band, near the tarsi palpi not tufted. Ungues unequal, the larger uniserrate, the smaller simple.

Length.—3·5 mm.

Habitat.—Bulacao, Mindora Islands and Angeles, Pampanga, Luzon Islands, Philippine Islands.

Time of capture.—August at Bulacao (Dr. Gardner); September at Angeles (Dr. Whitmore)."

Observations.—This species was described by Miss Ludlow from specimens sent by Dr. Fletcher Gardner, taken at Bulacao.

Miss Ludlow placed it in the genus *Stegomyia*, but the presence of flat scales on the mesonotum at once precludes it from that genus. It evidently comes in the genus *Quasistegomyia*. Although I have not seen perfect specimens (those sent me by Miss Ludlow being much denuded) there is no doubt, from her full and able description, that it comes in this genus.

Genus **STEGOMYIA.** Theobald.

Mono. Culicid. I., p. 283 (1901); Moust. et Mal. Infec., p. 62 (1903), Ed. and Ét. Sergent; Coquillett; Mos. do Brasil, p. 2 (1904), Bourroul; Genera Insect. Fam. Culicid., p. 18 (1905); Les Moust., p. 247 (1906), Blanchard; Class. Mosq. N. and M. America, Tec. Sc. 11, U. S. Dept. Agri., p. 15 (1906).

Nineteen species of true *Stegomyia* are now known.

The genus is entirely restricted to those species in which the head and scutellum are entirely clothed with flat scales. Thus several species previously provisionally included in this genus have been excluded.

The genus *Desvoidya* comes somewhere near *Stegomyia*, but differs in the male palpi, genitalia and general appearance to a marked degree, and the larvae also are very different. They certainly cannot be included in *Stegomyia*, as Giles would have done, for they are as different structurally from that genus as *Stegomyia* is from *Culex*.

The following species are known :—

Stegomyia fasciata, Fabricius, Syst. Antl., XXXVI., p. 16 (1855).
Stegomyia scutellaris, Walker, Journ. Proc. Linn. Soc. Lond. III., p. 77 (1859).
Stegomyia africana, Theobald, Mono. Culicid. I., p. 304 (1901) (West and Central).
Stegomyia thomsoni, Theobald, Genera Ins. Fam. Culicid., p. 18 (1905) (N. W. Provinces, India).
Stegomyia grantii, Theobald, Mono. Culicid. I., p. 306 (1901) (Sokotra).
Stegomyia nigeria, Theobald, idem, I., p. 303 (Bonny, West Africa).
Stegomyia crassipes, Van der Wulp, Dipt. Mid. Sum., p. 9 (Burma and Soeroelangoen).
Stegomyia argenteopunctata, Theobald, Mono. Culicid. I., p. 316 (1901) (Mashonaland).
Stegomyia (?) *punctolateralis*, Theobald, Entomologist, XXXVI., p. 156 (1903) (Queensland).

Stegomyia amesii, Ludlow, Journ. N. York Ent. Soc., p. 139 (1903) (Philippine Islands).
Stegomyia W-alba, Theobald, Ann Mus. Natio. Hung. III., p. 74 (1905) (India).
Stegomyia pseudonivea, Theobald, idem, p. 75 (Singapore).
Stegomyia simpsoni, Theobald, Entomologist, XXXVIII., p. 224 (1905) (Transvaal).
Stegomyia poweri, Theobald, Journ. Eco. Bio. I., p. 18 (1905) (Natal).
Stegomyia annulirostris, Theobald, Journ. Bomb. Nat. Hist. Soc. XVI., p. 239 (1905) (Ceylon).
Stegomyia mediopunctata, Theobald, idem, p. 240 (Ceylon).
Stegomyia (?) *brevipalpis*, Giles, Handbk. Gnats, 2nd ed., p. 384 (N. W. Provinces, India).
Stegomyia (?) *periskeleta*, Giles, Handbk. Gnats, 2nd ed., p. 371 (1902) (India).
Stegomyia argenteomaculata, n. sp. (Narcodam Islands).

SYNOPSIS OF STEGOMYIA.

A. Proboscis banded.

α. Legs basally banded.

Thorax brown with scattered creamy white scales *annulirostris.* Theobald.
Thorax black with narrow-curved golden scales..... *periskeleta.* Giles.

αα. Legs with basal and apical banding.

Fore legs with no bands; mid with apical and basal bands on first tarsal and second tarsal; hind with basal bands.

Thorax white in front with a brown eye-like spot on each side *thomsoni.* Theobald.

AA. Proboscis unbanded.

β. Legs basally banded.

γ. Abdomen basally banded.

Thorax with one median silvery white line *scutellaris.* Walker.
Thorax with 2 median yellow lines and lateral curved silvery lines *fasciata.* Fabricius.
Thorax with 2 short median pale lines and a white patch on each side *nigeria.* Theobald.
Thorax with a white W-shaped area in front, a prolongation curved on each side enclosing a brown eye-like spot *W-alba.* Theobald.

Thorax with 2 lateral white spots, the front one the largest, a small median one near head, 2 yellow median lines and a short silvery one on each side before scutellum *simpsoni.* Theobald.

Thorax with a silvery white scaled area in front and another each side in front of wings *argenteomaculata.* n. sp.

Thorax with a median yellowish-white line, a silvery patch on each side in front of the wings extending as a fine yellow line to scutellum and another silvery spot before base of each wing *poweri.* Theobald.

γγ. Abdomen unbanded.

Third hind tarsal nearly all white.

Thorax with 2 lateral white marks directed upwards *africana.* Theobald.

ββ. Legs with white lines as well as basal bands.

Thorax brown with white lines; abdomen with basal bands ... *grantii.* Theobald.

βββ. Fore mid legs with apical bands; hind basal.

Fourth tarsal of hind legs nearly all white..... *mediopunctata.* Theobald.

ββββ. Legs unbanded.

δ. Abdomen basally banded.

Thorax with front half silvery white, remainder bronzy-brown *pseudonivea.* Theobald.

δδ. Abdomen unbanded.

Thorax with six silvery spots *argenteopunctata.* Theobald.

δδδ. Abdomen with apical white lateral spots.

Thorax unadorned, except for pale scaled lines laterally ... *punctolateralis.* Theobald.

δδδδ. Abdomen with basal white lateral

Thorax with two pale indistinct median parallel lines and 2 silvery lateral spots *minuta.* Theobald.

Thorax unadorned *amesii.* Ludlow.

AAA. Proboscis yellow basally, dark apically.
Abdomen with apical pale bands *crassipes.* Van der Wulp.

STEGOMYIA ANNULIROSTRIS. Theobald (1905).

Journ. Bomb. Nat. Hist. Soc. Vol. XVI., p. 239 (1905).

Head creamy grey; proboscis black with a median white area. Thorax brown with creamy white scales scattered over it, most dense in front; pleurae brown with white puncta. Abdomen deep brown, the third, fourth and fifth segments with basal median triangular white spots, apical segments yellow-scaled, lateral white median spots to all the segments. Legs with very narrow pale basal bands to some of the fore and mid tarsals, broader ones on the hind pair; knee spots snowy white, also base of hind femora.

♀. Head covered with flat silky creamy grey scales which have a rusty brown hue at the sides when seen in some lights Proboscis black with a clear median white band. Palpi short, black-scaled, the apex apparently truncated. Antennae brown, basal segment testaceous.

Thorax black clothed with rather long, thick silky white and creamy narrow-curved scales, most densely in front and rather broader scales in front of the scutellum; golden-brown bristles project over the roots of the wings; scutellum covered with small flat white scales and with golden-brown border-bristles; metanotum reddish-brown; pleurae brown with patches of white scales. Abdomen deep blackish-brown, the third, fourth and fifth segments with a basal white median spot, somewhat triangular on the fourth and fifth segments, the apical segments with yellowish and creamy scales, except the extreme apex which is black, no markings dorsally on the first and second segments, each segment with lateral median white spots; border-bristles small pale golden.

Legs brown with some basal white bands: on the fore legs there is a narrow band at the base of the first, second and third tarsals; the base of the femora paler than the remainder; in the mid legs traces of similar pale bands and a white prominent knee spot, on the under side the foot is shiny creamy white; in the hind legs the greater part of the femora are white, the apex only dark and the white basal bands on the first tarsal and next

three tarsals broader than on the other feet; fore and mid ungues equal, unserrated, the hind equal and simple.

Wings with brown scales, fork-cells short, upper border darker than the rest of the wing; first sub-marginal longer and slightly narrower than the second posterior cell, its stem nearly as long as the cell, stem of the second posterior cell as long as the cell; posterior cross-vein some distance from the mid cross-vein. Lateral vein-scales rather long. Halteres with pale stem and fuscous knob.

Length.—4 mm.

Habitat.—Peradeniya, Ceylon. (E. E. Green).

Time of capture.—January (1902).

Observations.—Described from a single ♀.

It differs from all known Stegomyias that have a banded proboscis in its thoracic ornamentation. The mid tarsi look all dull white in some lights; this is due, I fancy, to the ventral surface of the segments being pale-scaled. The thorax is slightly rubbed, but is evidently entirely covered with pale scales which now and again present the same rusty hue as that seen in the head scales.

STEGOMYIA THOMSONI. Theobald (1905).

Gen. Ins. Fam. Culicid., p. 18 (1905).

Front of thorax silvery white with a brown eye-like spot on each side, rest of mesonotum with many white scales, but with some yellowish-brown ones over the root of wings; head silvery white; proboscis black with a broad median white band; abdomen blackish with basal white dagger-shaped median patches; fore legs brown with a white spot on base of first tarsal; mid legs with first tarsal white basally and apically, also the second tarsal; hind legs with white apical femoral spot, a white spot on basal half of tibia, base of first tarsal broadly white, and the other segments with basal white bands.

♀. Head black mostly covered with large flat snow white scales, with a dark patch on each side, and black bristles projecting forwards over the eyes; palpi jet black; proboscis black with a snow white median band; antennae black with pale internodes, basal and second segment black-scaled.

Thorax blackish-brown and snowy white, ornamented as follows: Prothoracic lobes white with strong black curved

bristles; mesonotum with the front half clothed with narrow curved silky white scales with a brown scaled eye-like spot on each side of the pale area and some brown scales in front, and black bristles projecting over the head, back part of mesonotum with mostly white scales, but having a pale-brown scaled median area and another on each side over the roots of the wings; the pale brown scales much narrower than the white; numerous brown bristles over the wing roots; scutellum densely clothed with flat snowy white scales and with golden-brown border-bristles, five large and five pallid small ones to mid lobe; pleurae brown with snowy puncta; metanotum deep brown.

Abdomen deep brown with basal white median spots, variable, some almost bands, others triangular, on the apical segments these pale areas spread over most of the segments and have mixed with them yellowish scales; there are also prominent white basal lateral spots; first segment all dark with pallid hairs; border-bristles pallid.

Legs black banded with white as follows: fore legs with narrow tibial band near base, first, second and third tarsals with narrow basal pale bands; mid legs with a pale band *near* base of femora, a snowy white apical spot, a white band near base of tibia, the base of the first three tarsals white; hind legs very similar, but the basal half of the femora is white, and all the tarsals have basal white bands; ungues of fore and mid legs uniserrated (teeth very basal), hind equal and simple.

Wings with dense brown scales of typical form; first submarginal cell longer and narrower than the second posterior cell, its stem about two-thirds the length of the cell, its base nearly level with that of the second posterior cell; second posterior cell opening out towards the edge of the wing, its stem as long as the cell; posterior cross-vein about two and a half times its own length distant from the mid.

Halteres with white stem and black and white knob.

Length.—3·5 mm.

Habitat.—N. W. Provinces, India (Capt. Wyville Thomson).

Observations.—Described from a single perfect ♀. Easily distinguished from *annulirostris* by the apical and basal leg banding.

STEGOMYIA FASCIATA. Fabricius (1805) (non Villiers 1789).

Culex fasciatus. Meigen (1805).
Culex calopus. Meigen (1818 ?).
Culex frater. Desvoidy (1827).
Culex taeniatus. Wiedemann (1828).
Culex konoupi. Brullé (1832).
Culex formosus. Walker (1848).
Culex excitans. Walker (1848).
Culex viridifrons. Walker (1848).
Culex inexorabilis. Walker (1848).
Culex annulitarsis. Macquart (1848).
Culex excitans. Walker (1856).
Culex impatibilis. Walker (1860).
Culex zonatipes. Walker (1861).
Culex bancroftii. Skuse (1886).
Culex mosquito. Arribalzaga (1891).
Culex elegans. Ficalbi (1896).
Culex rossii. Giles (1899).

Mém. de la Soc. d'Hist. Nat. d. Paris, III., p. 406, 14; p. 407; p. 408, 25, Rob. Desvoidy (1827); Gen. des Ins. Paris, pl. II., fig. 1 (1831), Guérin-Meneville and Percheron; Expedit. Sci. d. Morée, sec. Sc. Physiques Zoology, 1st Part (1832) (Konoupi), Brulle; Berlin Ent. Zeitschrift, XXXI., p. 73 (1887), Von Roder; Revis. Sist. del fam. del Culicid. Europ., p. 241, 5 and 6; p. 246, 7, and Bull. del Soc. Ent. Ital. XXXI., p. 203, 12 (1899), Ficalbi; Bull. No. 4, n. se., U. S. Dep. Agri. Div. Ent. Mosq., p. 22 (1896), Howard; Bull. No. 25, n. se., ibidem, pp. 30 and 31 (1900), Howard; Journ. Trop. Med. II., p. 64, fig. 2 (1899), Giles; Handbk. Gnats, p. 216, 13; p. 220, 14; p. 224, 16; p. 264, 18; p. 230, 22; p. 231, 24; p. 232, 25; p. 235, 25; p. 237, 30; p. 244, 38; p. 255, 48; p. 283, 78; p. 286, 85; p. 287, 86 (1900), Giles; Journ. Trop. Med. IV., p. 159 (1901), Giles; Hndbk. Gnats, 2nd ed., p. 372, 4 (1902), Giles; Thèse de Paris (1901), Macdonald; Mono. Culicid. I., p. 289 (1901), and III., p. 141 (1903), Theobald; Mem. IV. Liv. Sch. Trop. Med., p. iii. (1901), Theobald; Proc. Roy. Soc. LXIX., p. 383 (1902), Theobald; Les Moust., p. 249 (1905), Blanchard; Public Health Reports, Vol. XVIII., Nov. 13, No. 46 (1903), and idem Revis, Sep. 10 (1905), Howard; Mosq. do Brasil, p. 6 (1904), Bourroul-Lutz; Tech. Se. 11, U. S. Dept. Agri. Bu. Ent., p. 17 (1906), Coquillett; 20th Rept. St. Ento. N. York St. Mus., p. 489 (1906), Felt; Bull. 79, Ent. 22, N. York St. Mus., pp. 246^{2}, 336^{5}, 379^{6}, 381^{3} (1904), Felt; Mosq. Jamai., p. 19 (1905), Theobald and Grabham; Ann. Mus. Nation. Hung. III., p. 73 (1905), Theobald; Os. Mosq. no Para., p. 96 (1905), Goeldi.*

* Earlier references given in Vols. I. and III.

Additional localities.—Poros, Greece (Krüper); Cyprus, Larnaka (Bordan); Ceylon (E. E. Green); Cairo (F. Willcocks); Khartum and the Nile generally (Dr. A. Balfour); Ismailia (Prof. Ross and Sig. Gorgas); Port Said (Prof. Ross); Callao, Peru; Guayaquil, Ecuador; Valparaiso, Chile (Miss Ludlow); Ancon, Culebra and Colon Panama; Ceiba and Puerto Cortez, British Honduras; Bluefields, Nicaragua; Limon and Bocas del Tora, Costa Rica; Livingston, Puerto Barrios, Guatemala; Tampico, Acapulco, Juanajuata, Frontera, Vera Cruz, La Paz, Lower California, Coatzocoalcos, Pachuca, Tuxpan, Nautla, Tlacotalpam, Mazatlan, San Blas, Carmen, Cozumel, Champoton, Perihuete, Las Penas, Tepic, Pochutla, Progress, Monterey, Cordoba, Orizaba, Salina Cruz, Saltillo, Ciudad Victoria, Linares, Merida, Tonala, Rincon Antonio, all in Mexico (Dr. L. O. Howard).

It is also recorded from the following States in North America: Kentucky, Illinois, Tennessee, Arkansas, Louisiana, Mississippi, Alabama, Georgia, Florida, Texas, South Carolina, Arizona, Maryland, North Carolina, Indiana, Missouri; in the Bahama Islands at the following places: Nassau, Spanish Wells, Harbour Island, Current, Tarpon Bay, San Salvador, Long Island, and Government Harbour; from Habana, Guantanamo, Daiquiri, Baracoa, San Antonio de los Barros, Cayamas, "Yaquaramoa," Santiago, Caimanera, Batabano, Santiago de los Vegas, Quemados and the Isle of Pines in Cuba; at Apia in Samoa; Honolulu and Hilo, Hawaiian Islands (Dr. L. O. Howard and Mr. Terry); Philippine Islands on Mindano, Panay (Miss Ludlow); Santa Cruz, Teneriffe (Dr. Grabham); Siam, Perak, Singapore and ports along Malay Peninsula (Mr. Skeat, Dr. Durham, Dr. Daniels, etc.); Celebes; New Guinea; at Batavia, Soekaboemi, Garvet in Java (Prof. Marlatt); Palestine (Dr. Cropper); Komatipoort, Transvaal (Dr. Bostock); Transvaal (C. B. Simpson); French Guiana (Dr. Dye); many localities in Brazil (Drs. Lutz, Goeldi, Fajardo); Mauritius (Macquart); Bermuda (F. V. Theobald); Pitcairn Islands (Lord Crawford).

Note on Synonomy.—Unfortunately the name by which this important mosquito is now universally known has to sink. The specific name *fasciata* was used for a *Culex* by Villiers in 1789, and thus antedates Fabricius' name. I am not at all sure that Meigen's *calopus* is this species, but Blanchard and Coquillett assume it to be so. The description does not well apply. There is no doubt that Desvoidy's *frater* is and it will possibly prove that this will be the correct name. It would be far better,

however, to retain the name given by Fabricius and to abolish Villiers' species, as the description is unintelligible and the type has long ago ceased to exist. To save endless confusion the term by which this species is universally known is retained here.

Regarding its distribution and possible spread Howard* says: "We may expect to find this species everywhere in the moist tropical zone, or at all events, when introduced at any point within the low moist tropics, it may be expected to establish itself."

It is interesting to note that at present this species is confined in Malay to the ports only.

Some excitement has arisen from the fact of this insect being carried in banana ships, that it might and even had invaded

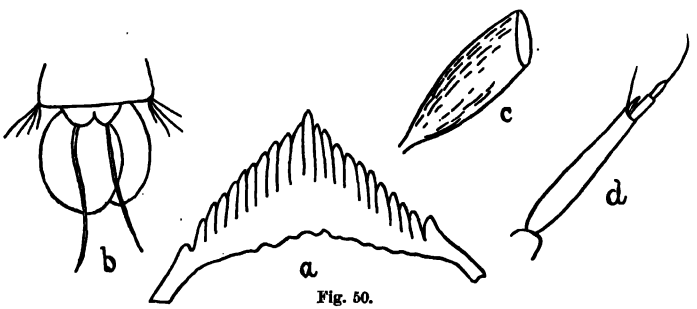


Fig. 50.

Stegomyia fasciata. Fabricius.

a, Labial plate of larva; b, caudal fan of pupa; c, siphon of pupa; d, antenna of larva.

England. All such cases reported have proved erroneous, the mosquito in question proving to be one of our native species.† It is very unlikely that *fasciata* would live here if they survived the sudden change of temperature coming from Central America or the West Indies in the banana ships. It is interesting to note, however, that it seems to have invaded New Orleans in that way, and to have occasioned the recent great outbreak of yellow fever there.

Professor Rubert Boyce and others have shown that in New Orleans and other neighbouring cities and towns *fasciata* breeds in the large water cisterns seen behind nearly every house,

* Concerning the Geographical Distribution of the Yellow Fever Mosquito, Public Health Reports, Vol. XVIII., No. 46, 1903; revis. Sept. 10, 1905, p. 8.

† Report Inj. Insects (1906), p. 106, Theobald.

and that by treating these collectively the Tiger Mosquito may soon be stamped out.

STEGOMYIA SCUTELLARIS. Walker (1859).

Culex scutellaris. Walker (1859).

Culex variegatus. Doleschall (1888) (non Schrank 1781).

Culex albopictus. Skuse (1895).

Journ. Proc. Linn. Soc. Lond. III., p. 77 (1859), Walker; Natuurkundig, Tijdschr. v. Ned. Ind. XVII., p. 77 (1858), Doleschall; Ind. Mus. Notes, III., 5, p. 20 (1895), Skuse; Les Moustiques, p, 7 (1900), Darutz de Grandpré and d'Emmerez de Charmoy; Mono. Culicid. I., p. 298 (1901), and III., p. 144 (1903), Theobald; Proc. Roy. Soc. LXIX., p. 483 (1902), Theobald; Les Moust., p. 257 (1905), Blanchard; Ann. Mus. Nation. Hung. III., p. 73 (1905), Theobald.

Additional localities.—Philippine Islands (Miss Ludlow); Sarawak (Dr. Barker, P.M.O.); Pitcairn Islands (Lord Crawford); New Guinea at Leleo, Berlinhafen, Stephansort, Astrolabe Bay, Muina (Biró); Ins. Deslacs and Ins. Graget (Biró).

Notes.—This proves to be a very abundant species in Malay, and breeds in bamboos. It occurs in houses as well as a wild species.

Dr. Barker, P.M.O., writes me that it is abundant out of doors in Sarawak, where there is much undergrowth, and does not go to houses at night, and not much during the daytime.

STEGOMYIA SCUTELLARIS. Walker.

Variety *samarensis.* Ludlow (1903).

Journ. N. York Ent. Soc., Sept. (1903); Canad. Ento. Vol. XXXVI., p. 71 (1904).

This variety differs from the type as follows:—

(i) Has two white lateral bands on head; no bands on antennae of female.

(ii) Silvery median thoracic line extends nearly the whole length of the mesonotum, tapering from the cephalic end to just in front of the scutellum, where it divides, forming two short, very fine, sub-median lines; there is also a narrow straight white line on

each side, exterior to these, extending cephalad from the scutellum about one-third of the length of the mesonotum, dividing its width almost exactly into quarters.

(iii) Femora of hind legs are white at the base, with a white line reaching almost to the knee; on fore and mid legs this line is not so distinct, nor is it so long; the first tarsal of the hind legs has a basal white band, and those of the fore and mid legs a basal white spot.

(iv) The first sub-marginal cell varies in length, but is as long as, usually longer, and sometimes more than twice as long as the stem.

Habitat.—Samar, Leyte and Mindoro in the Philippine Islands; Camp McKinlay, Hawaii (Miss Ludlow).

It appears to be generally common in the Philippine Islands.

STEGOMYIA W-ALBA. Theobald (1905).

Ann. Mus. Natio. Hung. III., p. 74 (1905).

Thorax rich brown, with a white, W-shaped area in front, a prolongation of this on each side bends round before the wing, enclosing an isolated brown patch on each side; scutellum white. Head white, with a black patch on each side. Abdomen black, with narrow basal white bands and large white lateral spots. Legs with tarsal segments with basal white bands, except the last two tarsals; mid femora with a prominent white median spot; hind femora with basal two-thirds creamy, apex silvery.

♀. Head clothed with flat silvery white scales in the middle, a large black patch on each side, with a small white spot near the ocellus on each, and white scales again at the sides, and to some extent a narrow white border around the eyes, a tuft of white scales projecting between them, a few dusky upright forked scales on the nape, and black bristles projecting over the eyes. Palpi black, apical half snowy white; proboscis rather short, deep brown; antennae brown, basal segment with white scales.

Thorax dark brown, ornamented with rich chestnut-brown and silvery white rather large narrow-curved scales, the white ones forming a solid W-shaped area in front, and a white line curving round in front of the wing to the pleurae on each side, enclosing an oval chestnut-brown area, and a few scattered white

scales in front of the scutellum; the white scales apparently slightly broader than the brown; scutellum with flat scales, the basal ones black, the apical silvery white; border-bristles rich brown, five (?) to the mid lobe; there are also numerous long brown bristles over the roots of the wings; metanotum deep brown; pleurae brown with large silvery-white puncta; prothoracic lobes with white scales.

Abdomen black, with narrow basal white bands which spread out slightly at the sides, large basal white lateral spots; venter dark with basal white bands.

Fore legs dark brown, the first, second and third tarsals with

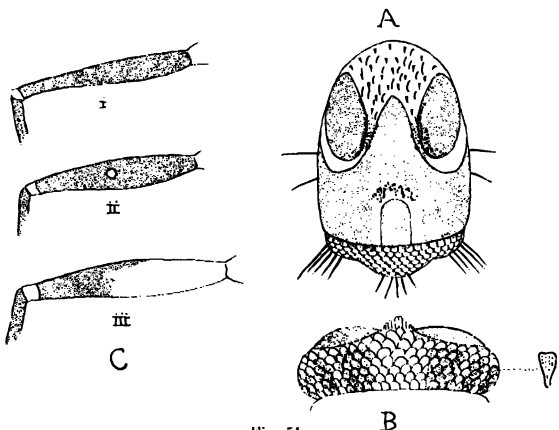


Fig. 51.
Stegomyia W-alba. Theobald.
A, thorax; B, head; C, femora of ♀.

narrow basal white bands, and there is a white spot beneath the apex of the femora; mid legs with a prominent round white spot on one side in the middle of the femora; apex of femora white; first, second and third tarsals basally white banded; the hind femora pale yellow, on their basal two-thirds, apex white, remainder deep brown; tarsal segments with broad white bands; ungues of the fore and mid legs rather small, equal, uniserrated, tooth fine.

Wings with the first sub-marginal cell longer and slightly narrower than the second posterior cell, its stem about half the length of the cell, its base about level with the base of the second posterior cell, stem of the latter as long as the cell; posterior cross-vein nearly three times its own length distant

from the mid cross-vein; halteres with yellow stem and black knob.

Length.—3·8 mm.

Habitat.—India orientalis (Biró, 1902).

Observations.—Described from a single perfect female. It can be told at once from all known *Stegomyiae* by the marked thoracic adornment, the large solid white W-shaped mark in front being easily noticed, also by the prominent round white spot on the side of the mid femora.

STEGOMYIA SIMPSONI. Theobald (1905).

The Entomologist, Vol. XXXIX., p. 224 (1905).

Head black, with a median white area and white at the sides. Proboscis black, unbanded. Thorax deep brown with a large silvery-white anterior lateral patch, a smaller one behind just before the root of the wing, a small silvery median spot close to head, two yellowish median lines, a short silvery one on each side of the bare space in front of the scutellum, which has silvery white scales in three patches. Pleurae with white puncta. Abdomen blackish with basal silvery-white bands. Legs basally banded white.

♀. Head clothed with black scales except for a median white area and grey lateral areas, a few white scales bordering the eyes. Antennae deep brown, basal segment black with a patch of silvery-white scales on the inside; clypeus and proboscis black. Palpi black scaled with white scaled apices.

Thorax black, clothed with bronzy, broad, elongate curved scales and ornamented with a large patch of broader silvery-white scales on each side, in front a smaller patch on each side just before the roots of the wings, and a small white median spot near the head, from which run two parallel dull yellow median lines to the bare space in front of the scutellum and a short silvery line on each side over the roots of the wings; the sides of the bare space in front of the scutellum bordered with white; prothoracic lobes with flat white scales.

Scutellum with large median lobe, with black scales basally, a prominent border of silvery-white ones, lateral lobes with large flat white ones; border-bristles brown.

Metanotum deep brown. Pleurae deep brown with prominent silvery puncta.

Abdomen deep blackish brown with silvery-white basal bands, except the first segment, which is all deep brown with pallid bristles, large basal white lateral spots to each segment.

Legs with anterior femora and tibiae black, first and second tarsals with broad basal white bands, last three tarsals black, a trace of a pale basal band on the tibia; in the mid legs the femora are pale at the base and have a small round white spot towards the apex which is white, remainder as in fore legs; hind legs with femora white along the basal half, an oval elongate silvery spot towards the apex, the latter snowy white, base of first, second and third tarsals broadly white banded, fourth tarsal all black, fifth pure white. Ungues all equal and simple.

Wings with the first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing than that of the second posterior, its stem about one-third the length of the cell, stem of the second posterior about as long as the cell; posterior cross-vein about two and a half times its own length distant from the mid cross-vein; the median vein scales on the fifth, where the branch arises, in two prominent lines.

Halteres with pallid base and dusky scaled knob.

Length.—3·5 to 4·5 mm.

♂. Thoracic adornment similar to that of the female. Palpi black with a white patch at the base of the two apical segments on one side only, that at the base of the apical one largest and a broader white band towards the base, and another small one still nearer the base; the two apical segments nearly equal, the apical one slightly the shorter, both and the apex of the antepenultimate with long scattered brown hairs, apical segment rounded at the tip.

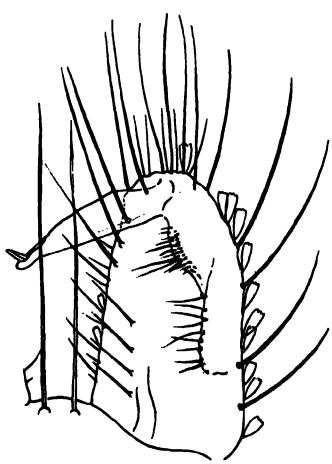


Fig. 52.
Male genitalia of *Stegomyia simpsoni*.
Theobald.

Antennae with deep brown plume-hairs and pale internodes.

Abdomen as long as in the female; fore and mid ungues unequal, simple, the larger one in the fore pair rather more

curved than the larger of the mid; the hind pair small, thick, curved and equal.

Claspers of genitalia shortish and rather broad, straight on one side, curved on the other, with a very small nearly terminal dark process; between the basal lobes two large spines with expanded bases.

Length.—3·5 to 4·5 mm.

Habitat.—The Transvaal (C. B. Simpson).

Observations.—Superficially resembles *S. fasciata*, but the thoracic ornamentation, the simple ♀ ungues and the different adornment of the ♂ palpi at once separate it. The ♀ palpi are composed of three segments, of which the apical is very marked, being suddenly contracted at the tip and ends in a round truncated surface.

STEGOMYIA ARGENTEOMACULATA. n. sp.

Head deep brown, with a silvery-white area in the middle and one on each side. Proboscis brown, unbanded. Thorax rich brown with a silvery-white scaled area in front, another at each side in front of the roots of the wings; three white patches on the scutellum; white puncta on the pleurae. Abdomen deep brown with narrow basal white bands. Legs brown, white banded, femora with white apex and a prominent white band before the apex.

♀. Head deep brown with flat black scales except for a silvery-white area in the middle in front and a white area at the sides throwing out some pale scales partly around the edge of the eyes; a tuft of deep brown, and golden-brown chaetae in front projecting inwards; palpi black with white-scaled apices; proboscis black; antennae deep brown with some white scales on the basal segment.

Thorax deep blackish-brown with a silvery-white scaled area in front, a small area on each side forming a spot in front of the base of the wings, broadening out laterally a few pale scales behind before the scutellum; dark area with dusky brown scales; scutellum deep brown with three apical patches of flat white scales and basal dark flat scales; pleurae with white puncta.

Abdomen deep blackish-brown with narrow basal white bands and snowy-white basal lateral spots.

Legs deep brown, fore and mid femora with apical white spots and a white spot towards the apex, a pale band at the base

of the fore and mid first and second tarsal segments; hind femora pale for about two-thirds of their length, then dark brown, and then a snowy-white apex; basal banding on the hind legs snowy-white.

Length.—4 mm.

Time of capture.—September.

Habitat.—Narcondam Islands (80 miles from Andaman and Nicobar Islands), Bay of Bengal (G. Rogers).

Observations.—Described from two ♀ s, not in good state, the hind legs being absent, but the marked thoracic adornment will at once separate it from any other true *Stegomyia.*

STEGOMYIA AFRICANA. Theobald (1901).

Mono. Culicid. I., p. 304 (1901).

Additional localities.—Ruwe, Lualaba Road, Congo Free State, in February (Dr. Yale Massey).

STEGOMYIA POWERI. Theobald (1905).

Journ. Econ. Biol., Vol. I., No. 1, p. 18 (1905).

Head velvety black with median and lateral white patches; palpi black with snowy-white apices; proboscis black. Thorax blackish-brown with a median yellowish-white line, a silvery patch on each side in front of the wings extending as a fine yellowish line towards the scutellum, and a silvery patch on each side of the wings. Abdomen blackish-brown with basal white bands and large white basal lateral spots. Legs black and banded with white, base of hind femora white; fore legs with basal white bands to the first and second tarsals, mid legs the same, but the second tarsal nearly all white, hind legs with the fourth tarsal all white, the fifth black.

♀. Head clothed with flat violet black scales, with a double row of median silvery-white ones, and a small patch on each side and a few white scales around the border of the eyes, bristles jet black; palpi black, scaled with snowy white scales apically, and a few forming a narrow band towards their middle; antennae deep brown with narrow white pale bands and deep brown verticillate hairs, basal segment black basally; with grey tomentum apically and a few white scales on the inner side; proboscis jet black.

Thorax deep brownish black with reddish-brown narrow-curved scales, ornamented as follows :—A median yellow line of narrow-curved scales extending from a small white spot near the head to the bare space in front of the scutellum, a patch of silvery-white broader scales on each side towards the front, from which proceeds a whitish-yellow line running parallel to the median one on each side passing down to the scutellum and composed of broader curved scales than the rest, there is also a smaller silvery-white spot just before the base of each wing, bristles deep brown ; all the scales slope uniformly backwards ; scutellum deep blackish-brown with flat silvery-white scales and deep brown border-bristles ; metanotum deep brown ; pleurae deep brown with silvery-white puncta, three forming a line anteriorly.

Abdomen deep blackish-brown, the first and second segments unbanded, the former with long pale golden-brown bristles, the third to sixth segments with basal white bands somewhat indented in the middle and not extending completely across the abdomen, the seventh segment with a few plain scales in the middle basally placed, all the segments with large basal snowy-white patches, border-bristles short, bright brown to golden.

Legs black, with the base of the fore tibiae, first tarsal and second tarsal white ; in the mid legs there is a white spot at the apex of the femora, and a prominent round white spot on the middle of the segment, a white basal band to the first tarsal, and the greater part of the second tarsal white, and traces of a few white scales at the base of the third tarsal ; in the hind legs the femora are white at the base, and have a small white apical spot, white basal bands to the first tarsal and next two tarsals, the third is pure white, the fourth black ; ungues of fore and mid legs uniserrated, of hind equal and simple.

Wings with dense brown scales ; first sub-marginal cell considerably longer and narrower than the second posterior cell, its base considerably nearer the base of the wing than that of the second posterior cell, its stem less than one-half the length of the cell ; stem of the second posterior cell as long as the cell ; posterior cross-vein nearly three times its own length distant from the mid. Halteres thick, with ochreous stem and fuscous knob.

Length.—5 mm.

Habitat.—Natal (Dr. Power).

Observations.—Described from a perfect female. It is a very

distinct species, easily told by the single median yellow thoracic line and legs from *S. scutellaris*, Walker, and by the single, not double line, seen in *S. simpsoni*, as well as by the legs. It is a very handsome species, and so far nothing like it has occurred outside Natal. Probably it will be found in the Transvaal and other neighbouring regions. Apparently closely related to *gardnerii*, Ludlow, from the Philippine Islands, but easily separated by the large anterior silvery-white thoracic spot and by the ornamentation of the hind tarsals.

STEGOMYIA MEDIOPUNCTATA. Theobald (1905).

Journ. Bomb. Nat. Hist. Soc. Vol. XVI., p. 240 (1905).

Head with a snowy-white median area, black at the sides and with a few white lateral scales; proboscis black, unbanded; palpi black with white apex. Thorax deep brown, the front with a broad area of large white scattered narrow-curved scales, the remainder with pale dull brown scales; scutellum white-scaled in middle, brown laterally; abdomen black, segments with basal median white spots. Legs deep brown, the fore and mid first and second tarsals with small white apical bands, the hind with broad white basal bands to the first and second tarsals, third tarsal all black, fourth nearly all white except for a minute black apex, fifth black.

♀. Head clothed with large flat scales, those on the middle snowy-white, on each side black with a few white ones on the extreme sides, a few black bristles project forwards; clypeus black; proboscis black; palpi black scaled with snowy white apical scales; antennæ deep brown, basal segment black with a crown of snowy-white scales.

Thorax deep brown covered with rather large irregular narrow-curved scales, those in the middle in front being white, those behind and at the sides pale dull brown; scutellum prominently trilobed, the median lobe with large flat white scales, the lateral lobes with large flat, dull brown scales and with brown border-bristles; pleurae brown with patches of white scales.

Fore legs brown, a narrow pale band at the base of the first and second tarsals, the mid legs the same, only there is a distinct snowy-white knee spot; hind legs with the base and under surface of femora white, base of first and second tarsal

segments white, the third tarsal all black, the fourth all white but for a small black apex, last tarsal small all black.

Wings with typical brown Stegomyian scales; first submarginal cell longer and slightly narrower than the second posterior cell, its base slightly nearer the base of the wing, its



Fig. 53.
Wing of *Stegomyia mediopunctata*. ♀. Theobald.

stem about half the length of the cell; stem of the second posterior nearly as long as the cell; posterior cross-vein about twice its own length distant from the mid.

Halteres with fuscous knob.

Length.—3 mm.

Habitat.—Peradeniya, Ceylon (E. E. Green).

Time of capture.—November (1901).

Observations.—Described from a single female in excellent condition. The curious leg banding will at once separate it from all known Stegomyia.

STEGOMYIA PSEUDONIVEA. Theobald (1905).

Ann. Mus. Natio. Hung. III., p. 75 (1905).

Head clothed with flat black scales and a narrow grey border around the eyes; palpi and proboscis black. Thorax with the front half silvery-white, remainder bronzy-brown. Legs deep brown, unbanded, venter and extreme base of femora grey. Ungues equal and uniserrated.

♀. Head clothed with flat dark brown scales, showing bright violet reflections in certain lights, a narrow grey border of flat scales around the eyes, and dull grey flat scales at the sides, some black bristles projecting forwards; palpi, clypeus and proboscis deep brown; antennae deep brown basal segment with a few grey scales and the pubescence dull grey.

Thorax deep brown, fore two-thirds clothed with rather large silvery-white narrow-curved scales, remainder with similar

bronzy scales, black bristles project forward over the head; scutellum black with flat black to bronzy scales; metanotum deep brown; prothoracic lobes reddish-brown or deep brown according to the light, with a few deep brown bristles; pleurae brown with silvery spots.

Abdomen black, the fifth, sixth and seventh segments with basal white bands and traces of basal lateral spots; venter brown with basal silvery bands.

Legs deep brown; base and venter of femora grey; coxae brown; fore and mid ungues small, equal and uniserrated, hind equal and simple.

Wings with the first sub-marginal longer, but very little narrower than the second posterior cell, its base nearer the base of the wing, its stem rather more than half the length of the cell; stem of the second posterior about as long as the cell; posterior cross-vein rather more than its own length distant from the mid cross-vein. Halteres with grey stem and widely expanded fuscous knob.

Length.—3 mm.

Habitat.—Singapore (Biró, 1902).

Time of capture.—January.

Observations.—Described from a single ♀. It bears a close resemblance to *nivea*, Ludlow, but can at once be told by the fore and mid ungues being uniserrated and not simple, and by the femora being dark above, not white as in *nivea*.

STEGOMYIA PUNCTOLATERALIS. Theobald (1903).

The Entomologist, Vol. XXXVI., p. 156 (1903).

Thorax black with dense bronzy-brown scales, unadorned except for pale scaled lines laterally; pleurae snowy-white, the white extending on to the mesonotum as a broad white line in front of the roots of the wings, and a narrower one just over the roots of the wings; prothoracic lobes white, separated by a black curved line from the mesonotum. Proboscis black unbanded. Abdomen black, with apical white lateral spots; venter mostly white. Legs black unbanded; coxae and under part of femora, tibiae, and to some extent the under surface of the first tarsal of the hind legs white.

♀. Head covered with flat bronzy-brown scales, and a pale, almost white, border around the eyes. Palpi, proboscis, clypeus

and antennae deep black. Palpi slightly clavate, much contracted at the base, apical segment minute.

Thorax black, with bronzy-brown narrow-curved scales, paler almost grey ones behind and at the sides forming lateral pale lines, and a narrower one just over the roots of the wings; prothoracic lobes white scaled, separated from the rest of the thorax by a prominent black line; pleurae densely white scaled; scutellum with small flat grey scales and brown border-bristles, four to the mid lobe; metanotum deep brown.

Abdomen deep brown with violet reflections, in some lights under the microscope bright violet, each segment with prominent apical lateral creamy spots, which in some segments spread almost across the apical borders so as to form prominent pale lines, but they never quite meet, except in the penultimate segment; the first segment testaceous, with large dense black scales in two confluent spots, with brown bristles; border-bristles very short, pale brown, shining apically. Venter creamy-white; the apical spots are very pronounced on the ventral surface in dried specimens,

Legs jet-black; under surface of femora, tibiae, and first hind tarsal silvery-white; ungues small, equal, and simple.

Wings with brown scales; fork-cells of moderate length, the first sub-marginal cell considerably longer and narrower than the second posterior cell, its base the nearer to the base of the wing; stem of the first sub-marginal cell more than half its length; stem of the second posterior cell nearly as long as the cell; posterior cross-vein about twice its own length distant from the mid cross-vein.

Halteres with dull testaceous stem and fuscous knob.

Length.—4·5 mm.

♂. Thorax and abdomen as in the ♀, but the abdomen narrower and the apical lateral spots not quite so prominent.

Basal lobes of genitalia densely bristly, bristles large, and arise from distinct papillae; claspers long and thin, simple.

Antennae deep brown, with deep brown plume-hairs, pale banding more or less noticeable; proboscis black; palpi shorter than the proboscis, deep blackish-brown, no hair-tufts, the last two segments of nearly equal length, the apical one slightly shorter and with terminal bristles.

Legs as in the ♀; fore ungues unequal, the larger uniserrated, the smaller simple; mid ungues unequal, both simple; posterior ones very small, equal and simple, much curved.

Wings with brown scales; the first sub-marginal cell longer and narrower than the second posterior cell, the base nearly level with that of the latter; stem of the first sub-marginal cell about one-third the length of the cell; stem of the second posterior about two-thirds the length of the cell; posterior cross-vein considerably longer than the mid and more than twice its length distant from it.

Length.—5·5 mm.

Habitat.—South Queensland (Dr. Bancroft).

Time of capture.—January.

Observations.—Described from a series of dried and spirit specimens collected and bred by Dr. Bancroft. It is a very marked species, one striking character being the black curved line behind the white scaled prothoracic lobes.

The white lateral apical spots are also characteristic.

Dr. Bancroft kept this species alive for a month in confinement, and during that time they bit on three occasions.

Dr. Bancroft has just written me stating that this species oviposits in a "raft."

STEGOMYIA AMESII. Ludlow (1903).

Journ. N. Y. Ent. Soc., Sept., p. 139 (1903).

Head dark brown, a pale spot on the sides; proboscis unbanded. Thorax dark brown. Abdomen dark brown with blue and green iridescence, and small white lateral spots. Legs unbanded.

"♀. Head covered with dark brown scales, giving dark iridescence, a minute pale spot on the sides, forked scales dark brown, brown hairs between the eyes; antennae dark brown, verticels brown, pubescence brown, first segment testaceous; palpi dark brown; proboscis very dark scaled, dark iridescence in some lights; clypeus brown; eyes brown.

Thorax dark brown and rather closely covered with small slender dark brown curved scales; scutellum dark brown; metanotum dark brown; pleurae brown with three bunches of white scales.

Abdomen brown, heavily covered with dark brown scales giving dark green and blue iridescence, small white lateral spots on most of the segments; venter dark.

Legs dark brown, the femora light on ventral side, otherwise the whole of the leg is dark, but the scales are so iridescent, those of the femora and tibiae reflecting green and blue lights, and those on metatarsi and tarsal segments giving bronze lights that the latter often appear much lighter. Ungues equal and simple.

Wings heavily brown scaled with typical *Stegomyia* scales; first submarginal cell a little longer and about the same width as the second posterior, its base slightly interior to the latter's. The supernumerary cross-vein meets the mid at an obtuse angle and is about the same length as the mid, as is also the posterior cross-vein, which is distant from the mid about three times its own length. Halteres heavily light scaled on the stem, the knob dark.

Length.—3 to 3·5 mm.

Habitat.—Oras, Samar; Tacloban, Leyte; Twin Peaks, Banguet; Luzon, Philippine Islands.

Time of capture.—June–December."

Observations.—This is a very small dark species near *S. minuta*, Theob., and was sent me by Dr. Roger P. Ames, Major-Surgeon U.S.A., who did the clinical work in the investigation by Major Reed concerning mosquitoes and "yellow fever."

Genus **PSEUDOSKUSEA.** nov. gen.

Skusea multiplex, Theobald, must come in a new genus, as the type of *Skusea* is *funerea*, Theobald, which has short palpi in the ♂, and is thus as I at first suggested, an *Aedine*.

Multiplex has long palpi in the ♂.

The generic characters of *Pseudoskusea* may be taken as follows: Head with flat scales; palpi short in ♀, long in ♂, very thin, no hair-tufts, resembling Desvoidea. Scutellum with narrow-curved scales. *Mid ungues of male equal in size;* a character found only in this genus.

Pseudoskusea multiplex. Theobald (1903).

Skusea multiplex. Theobald (1903).

Mono. Culicid. III., p. 293 (1903) ♀; Ann. Mus. Nat. Hung. III., p. 78 (1905) (♂), Theobald.

A large series belonging to the National Museum of Hungary from New Guinea, from Friedrich-Wilhelmshafen, Stephansort, Astrolabe Bay, and Muina (Biró), 1896 and 1900, and Ins. Graget (Biró), 1901, have been examined.

Some of the specimens do not show the median pale head spot, others show it as prominently as in the type from Queensland. The basal segment of the antennae in some is dark, in others, as in the type, testaceous. The thorax shows no trace of the two pale lines, which almost form one line across it, seen

in the Australian specimens. The whole thorax is unadorned, of an uniform dark brown, clothed with uniformly-scattered reddish-brown scales, which are bronzy under the two-third power.

I cannot see any reason for separating these New Guinea specimens as a distinct species as there are only colour differences. The male is described here for the first time.

♂. Head all black scaled, with the lateral pale areas only. Thorax and abdomen as in the ♀.

Palpi rather longer than the proboscis, very thin, black, no hair-tufts, resembling those of *Desvoidya*. Apical segment of palpi slightly shorter than the penultimate segment.

Wings long, fork-cells short, first sub-marginal cell longer and narrower than the second posterior cell, its base slightly nearer the apex of the wing than that of the second posterior, its stem as long as the cell; stem of the second posterior longer than the cell; supernumerary and mid cross-veins almost in one straight line, the posterior about its own length distant from the mid.

Legs as in the ♀; fore ungues unequal, the larger nearly twice as long as the smaller, both uniserrated, the serration of the smaller close to the base; mid ungues equal and uniserrated; hind equal and simple.

Length.—4 to 4·5 mm.

Habitat.—New Guinea (Biró, 1900).

Observations.—The ♂ very closely resembles the ♂ of *Desvoidya*, but the absence of flat scutellar scales at once separates it. There are only three males in the series one of which I have made preparations of in balsam. The type is in the collection of the National Museum of Hungary.

Genus **LUDLOWIA.** nov. gen.

Head clothed with flat scales all over, some upright forked scales behind. Palpi long in male, one large swollen apical segment and a long thin penultimate one; antennae plumose in ♂.

Thorax and scutellum clothed with long narrow-curved scales. Fork-cells in ♂ small; first long vein some distance from the costal vein but curved upwards towards the end and then

downwards, the second long vein is curved downwards and then upwards, so that the cell is large in the middle, contracted at each end; scales broad.

Two ♂'s so far are known in this genus, which is very distinct, the squamose characters are very marked and the palpi quite different to any others.*

LUDLOWIA CHAMBERLAINI. Ludlow (1903).

Mimomyia (?) chamberlaini. Ludlow (1903).

Canad. Entomo. XXXVII., p. 297 (1903).

"♂. Head light, heavily covered with light yellow, almost white iridescent flat scales, a few brown forked scales on the occiput extending well around to the sides; two large bristles projecting forward between the eyes, four or five around the eyes; antennae brown, very plumose, light banded, basal segment bare, dark, verticels brown, but giving light (tow-coloured) reflections with a suggestion of orange; proboscis orange, tip black; palpi longer than the proboscis, mostly yellow scaled ventrally, but partly brown scaled dorsally, a dark band at the apex of the penultimate segment, ultimate segment clubbed (suggesting something of the *Anopheles*) and quite dark at the tip; clypeus yellow; eyes brown and silver.

Thorax: dorsum dark brown, heavily covered with dark brown slender curved hairs, laterally light, covered with light golden curved scales, forming a large spot over and around the wing joint and running in a line cephalad on the edge of the mesonotum, light bristles over wing joint; pleurae and prothoracic lobes almost white; scutellum dark brown, median lobe, and light lateral lobes, both covered with dark brown slender curved scales, six large and a few small bristles on the mid lobe, four bristles on the lateral lobes; metanotum dark brown. Abdomen light, thickly covered with dark brown flat scales, having deep blue iridescence; very large basal lateral light spots forming an almost continuous lateral yellowish stripe, also continuous with the venter, which is very light yellow, almost white. All segments heavily haired.

Legs: coxae and trochanters all light. In fore legs the femora are brown dorsally and ventrally light yellow, growing darker towards the apex, tibiae brown (giving red-bronze and purple lights), first tarsal brown, with tiny light apical bands, tarsal segments brown, second and third also with light apical bands. Ungues unequal, very large, one bi-serrate, the smaller almost straight. Mid legs much as in fore legs; there are tiny light bands on the first, second and third tarsal segments, and in some lights the whole first tarsal looks light. Ungues as in the fore legs. Hind legs have femora brown, with red reflections, tibiae brown with

* Since this went to press, Miss Ludlow sends me description of a ♀ *chamberlaini*, and also of another species, *L. minima.*

light apical bands. There are also narrow apical bands on the first, second and third tarsal segments, the remainder of the hind legs is missing. In some cases the bands seem slightly to involve both segments, but in any case they are minute.

Wing light and apparently partly denuded, but there are rather broadly truncated, sometimes asymmetrical dark scales, with dark blue green iridescence on costa, sub-costa, and first long vein, and a few of the same 'broad-ended' scales on the other veins; first sub-marginal cell about one-third longer and a third narrower than the second posterior, the base of the latter, however, being well interior to that of the first sub-marginal. Stem of the first sub-marginal about one-third longer than the cell and somewhat longer than the second posterior. Mid cross-vein is about the same length as supernumerary, which it meets, and posterior cross-vein is about one-fourth longer, and is distant from the mid about three-fourths of its own length.

Halteres light, knob brown scaled.

Length.—4·5 mm.

Habitat.—Bayamban, Pangasinan, Luzon, Philippine Islands.

Time of capture.—May (15th).

Described from one specimen taken by Capt. W. P. Chamberlain, after whom it is named."

This insect was placed provisionally under *Mimomyia* by Miss Ludlow. It does not, however, come in that genus, because the ♂ palpi in *Mimomyia*, although long, are not nearly so long as the proboscis and end acutely and not clavate as in *Ludlowia*, nor is the proboscis swollen as it is in *Mimomyia*.

It comes in a new genus with the male I referred to in the First Gordon College Report, p. 83 (1905).

This genus is described here under the name *Ludlowia* from Miss Ludlow's type which she kindly sent me.

LUDLOWIA SUDANENSIS. n. sp.

First Rept. Gord. Coll. Well. Labs., p. 83 (1905).

♂. Proboscis black; labellae paler; palpi brown, a pale band on the lower side of centre; the apical segment, rather swollen and bent, covered with scales and a few bristles. Antennae plumose with a long terminal pilose segment. Head dark and small, eyes deep purplish-black; pale upright scales, not forked over the vertex and occiput; white flat scales on either side of a dark median line of scales, a few black scales on the nape. Thorax denuded, with traces of black and long golden hair-like scales; pleurae brown with white patches.

Abdomen purplish-black with basal yellowish white bands to the segments, which expand laterally and spread on to the venter.

Legs with knee spot and long tibial bristles, pale tibio-metatarsal tufts and the three last hind tarsals pale yellow; posterior ungues much smaller than the others, all apparently equal and simple.

Length.—4 mm.

Habitat.—Bahr-el-Jebel, North Sudd Country.

Observations.—Described from a single damaged male mounted in balsam. It is most marked owing to the curious form of the palpi which separate it from all other *Culicids* except *chamberlaini*. It undoubtedly comes in the same genus as Miss Ludlow's species. I referred to it in the Wellcome Laboratory Report as "a new genus and species."

Genus **SCUTOMYIA.** Theobald.

The Entomologist, p. 77 (1904); Genera Insect. Fam. Culicid., p. 19 (1905), Theobald.

Head covered with flat scales except in the mid region, where there are narrow-curved scales forming a median row. Scutellum entirely clothed with flat scales. Other characters as in *Macleaya*.

This genus differs from *Stegomyia* in having narrow-curved scales on the head, and from *Macleaya* in having the scutellum with all flat scales. From *Leicesteria* it differs in having all flat scales on the scutellum.

Geographical distribution of species.—Five species are known, occurring in Africa, Australia, Malay States, and Philippine Islands.

1. *S. notoscripta*, Skuse, Proc. Linn. Soc. N. S. Wales, Vol. III., p. 1738 (1889) (Australia).
 albopictus, Skuse, Indian Mus. Notes, Vol. XXXV., p. 20.
2. *S. sugens*, Wiedemann, Aussereurop. Zweifl. Ins., p. 545 (1828) (West and Central Africa).
 vittatus, Bigot, Ann. Ent. Soc. Fr. S. 4, Vol. I. (1861).
3. *S. marshallii*, Theobald, Mono. Culicid. Vol. I., p. 310 (1901) (Central Africa).
4. *S. nivea*, Ludlow, Journ. New York Ent. Soc. Vol. II., p. 139 (1903), (Philippine Islands, Fed. Malay States).
5. *S. albolineata* Theobald, The Entom., p. 77 (1904) (Kuala Lumpur).

The five known species tabulate as follows :—

Legs basally banded with white.
 Last hind tarsal all white.
 Proboscis prominently white banded.
 Thorax with median silver line, two lateral curved lines and two short yellow lateral ones *notoscripta.* Skuse.
 Proboscis with trace of banding.
 Thorax with four silvery spots..... *sugens.* Wiedemann.
Legs with apical banding.
 Proboscis unbanded.
 Thorax with four silvery spots *marshallii.* Theobald.
Legs fore and mid unbanded, hind with basal white dorsal patches.
 Thorax with a broad median silvery line in front *albolineata.* Theobald.
Legs unbanded.
 Thorax with front two-thirds silvery white with three black lines *nivea.* Ludlow.

SCUTOMYIA ALBOLINEATA. Theobald (1904).

The Entomologist, Vol. XXXVII., p. 77 (1904).

Thorax black, with a broad median silvery-white line in front and a median silvery spot on the scutellum. Abdomen black, with basal silvery-white lateral spots, the last two segments with basal silvery-white bands. Fore and mid legs black, unbanded ; the hind with the first, second and third tarsals with basal white dorsal patches.

♀. Head clothed with flat black scales except in the middle, where there is a median broad area of white, narrow-curved scales : palpi, clypeus, proboscis and antennae black, the basal segment of the latter with white scales inside ; proboscis long, nearly as long as the whole body.

Thorax black, with long narrow-curved bronzy-black scales and with a broad median silvery-white line running from the front of the mesothorax to about its middle ; numerous long black bristles project in front and over the roots of the wings ; scutellum black, very deeply trilobed, the mid lobe with dense flat silvery-white scales, the lateral lobes with flat black scales ; there are also a few black ones bordering the posterior edge of the mid lobe which has five brown bristles ; metanotum black and shiny ; pleurae brown, with silvery-white spots.

Abdomen narrow basally, broadening to the apex which is

truncated, smoky black, with triangular silvery-white lateral basal spots, the two last segments with basal white bands (under the microscope the lateral spots look pale blue); border-bristles black; the first segment densely black scaled, large, the black scales forming two backwardly-projecting patches and with black bristles; venter with broadish basal white bands.

Legs black, the fore and mid pairs unbanded, the hind with the base and under side of femora yellowish-white, a small snowy-white apical spot; the first, second and third tarsals with a basal streak of white on the upper surface, giving a banded appearance when viewed from above; ungues all equal and simple.

Wings with brown-scaled veins, the costa dark, fork-cells small, the first sub-marginal longer and narrower than the second posterior, its stem nearly as long as the cell; stem of the second posterior as long as the cell; bases of the fork-cells nearly level; posterior cross-vein rather more than its own length distant from the mid; median vein scales small and spatulate, dark; lateral ones short and rather thick on the first and second veins, others longer and thinner. Halteres short and with contorted yellow stems, the knobs broadly expanded with black scales.

Length.—4 mm.

Habitat.—Kuala Lumpur (Dr. Leicester).

Observations.—Described from a single female. It bears, at first sight, a close resemblance to *Stegomyia scutellaris*, Walker, but the median white thoracic stripe is wider, and the markings of the abdomen and legs are different; moreover, it cannot be placed in the genus *Stegomyia*. I am not sure if the narrow waist of the abdomen is natural or due to subsequent contraction in drying.

The fact that the white abdominal lateral patches appear blue under the microscope and yet not under a hand-lens is peculiar. I have not observed this in any other mosquito.

SCUTOMYIA NOTOSCRIPTA. Skuse (1889).

Stegomyia notoscripta. Skuse.

Culex notoscripta. Skuse.

Proc. Linn. Soc. N. S. Wales, III., p. 1738 (1889), Skuse; Mono. Culicid. I., p. 286 (1901), and III., p. 145 (1903), Theobald; Ann. Mus. Nation. Hung. III., p. 76 (1905), Theobald.

This common Australian mosquito was provisionally placed in *Stegomyia*. It is now found to belong to this genus.

Dr. Bancroft writes me that he is sure this species oviposits singly and not in a "raft" as Skuse stated.

Additional localities.—Muina, Seleo, Berlinhafen, Friedrich-Wilhelmshafen, New Guinea; Ins. Graget (Biró); India (Major Giles, I.M.S.)? (I do not think this occurs in India); Sydney, N. S. Wales (Dr. Bancroft).

SCUTOMYIA SUGENS. Wiedemann (1828).

Stegomyia sugens. Wiedemann.

Culex sugens. Wiedemann.

Culex vittatus. Bigot (1861).

Auss. Zweiflug. Ins. I., 545, 4 (1828), Wiedemann; Ann. Soc. Ent. d. Fr. S. 4, t. 1 (1861), Bigot; Bull. Soc. Ent. Ital., p. 257 (1886), Ficalbi; Mono. Culicid. I., p. 300 (1901), Theobald; Ann. Mus. Nation. Hung. III., p. 77 (1905), Theobald.

Additional localities.—Transvaal (C. B. Simpson); Entebbe, Uganda (Drs. Christy, Hodges, etc.); Gambia (Drs. Dutton and Todd); India (Dr. Christophers and M. Biró); Nubia and Aden.

Note.—Central African forms are smaller than any others I have seen.

GENUS **AEDIMORPHUS.** Theobald.

Mono. Culicid. III., p. 290 (1903); Genera Insectorum, Fam. Culicid., p. 20 (1904).

One new species has been added to this genus.

AEDIMORPHUS ALBOANNULATUS. Theobald.

The Entomologist, Vol. XXXVIII., p. 154 (1905).

Head dark brown; proboscis black, with a white band on the apical half. Thorax deep rich brown, with scanty golden scales; a silvery white spot on each prothoracic lobe; pleurae pale brown, with silvery white puncta; scutellum silvery white. Abdomen deep brown, unbanded, with basal white lateral spots. Legs deep brown, with apical silvery white bands, most pronounced on the hind legs, the last hind tarsal being all white.

♀. Head deep brown, clothed with dusky flat scales over most of the surface and some flat creamy ones at the sides; around the edges rather large golden narrow-curved scales and

smaller and duller ones at the back; over the whole surface very long deep black upright forked scales. Proboscis black, with a pale ochreous band slightly towards the apical half. Palpi deep brown and densely scaly; clypeus brown.

Thorax rich deep chestnut-brown, with scattered golden curved scales; silvery white flat scales on the prothoracic lobes; numerous black bristles over the roots of the wings. Scutellum brown, clothed with silvery white flat scales and black border-bristles, six to the mid lobe and some smaller ones with them; pleurae brown, with prominent silvery puncta composed of flat scales. One large spot of these scales seems to project outwards, and can be seen when the insect is viewed from above, looking almost like a silvery spot close to the roots of the wings.

Abdomen deep brown, with basal white lateral spots and pale venter.

Legs black, with apical silvery white bands as follows: small but prominent on all the femora and tibiae of all the legs, on all the first tarsals and on the fore and mid second tarsal segment; in the hind legs prominent on all the segments, the last tarsal being pure white. All the ungues equal and uniserrated. Wings with the first sub-marginal cell longer and narrower than the second posterior cell, its base nearly level with that of the second posterior cell, stem of the first sub-marginal about two-thirds the length of the cell, stem of the second posterior as long as the cell; posterior cross-vein nearly twice its own length distant from the mid. Halteres with pale stem and fuscous and white knob.

The scales of the wings are deep brown, especially along the costa, with deep violet reflections along the base and a white patch at the base of the costa and first long vein.

Length.—4·5 mm.

♂. Palpi about the same length as the banded proboscis, the two apical segments small and about equal, a pale band at the base of the apical segment; on both apical segments and on the apex of the antepenultimate a few long brown hairs. Fore and mid ungues unequal, the mid more so than the front ones, both uniserrated, the tooth of the larger mid unguis near the base and small.

Length.—4 to 4·5 mm.

Habitat.—Sierra Leone (Capt. F. Smith, R.A.M.C.).

Observations.—Described from two specimens in perfect condition collected by Captain F. Smith, R.A.M.C. It is a very

marked species, the general ornamentation of the thorax and legs being characteristic. I cannot be certain as to the exact structure of the ♂ ungues, nor genitalia, which are hidden in scales and hairs, and there was no second specimen of ♂ sent to dissect.

Genus **LEICESTERIA.** Theobald.

The Entomologist, Vol. XXXVII., p. 211 (Aug., 1904); Gen. Ins. Fam. Culicid., p. 20 (1905), Theobald.

Head covered with flat scales, upright forked scales, and a row of spindle-shaped ones around the eyes. Mesothorax with narrow- and broad-curved scales; scutellum and prothoracic lobes with flat scales. Palpi of the ♂ slender, no hair-tufts, longer than proboscis; of the ♀ half the length of the proboscis, composed of four segments. Proboscis swollen apically. Wing scales and venation much as in *Stegomyia*.

This genus comes near *Eretmapodites* in appearance, but can at once be told by the scales around the eyes and the great length of the ♀ palpi.

Geographical distribution of species.—A single species only occurs.

L. longipalpis, Leicester, The Entom., p. 211 (Aug., 1904) (Kuala Lumpur).

Leicesteria longipalpis. Leicester (1904).

The Entomologist, Vol. XXXVII., p. 211 (1904).

The following is the original description:—

"Head black in the middle, creamy at the sides; palpi half the length of the proboscis, both black. Thorax yellowish-brown, with bronze scales and a creamy line on each side as far as the base of the wings. Abdomen with apical white lateral spots. Legs unbanded.

♀. Head black; the vertex, occiput, and nape covered with broad, flat, black scales; along the orbital margin is a narrow row of spindle-shaped creamy scales; laterally, where the black scales end, is a band of creamy scales and then black scales again. There are a moderate number of black upright forked scales confined to the nape.

Antennae with the basal segment dirty yellow; the inner face is rather thickly clad with small flat scales, with a few dark ones interspersed; the basal half of the second segment is similar in colour to the basal segment; the apical half and the succeeding segments of the antennae are black, covered with numerous short white hairs; verticillate hairs black; last segments of antennae not elongated.

Clypeus dark brown, a few narrow white scales on its anterior margin. *Palpi black scaled, four-jointed; third segment very long —longer than all the other segments put together; fourth segment minute. The palpi are unusually long, being fully half the length of the proboscis.*

Proboscis thick, entirely black scaled. Prothoracic lobes thickly clad with flat spatulate scales, white on the lower half, black above, and from the apex a tuft of short dark brown bristles projects.

Mesonotum yellowish-brown; running around the margin anteriorly and laterally as far as the wing bases is a creamy line, composed of broad-curved scales; the rest of the mesonotum is densely clad with long, narrow-curved, bronzy scales, which are especially dense and long over the roots of the wings, where they form dense tufts. The colour of these scales under a hand lens is metallic bronze, but under a two-third power many appear pale brown. In some lights they appear purple; so do the dark scales on the head and proboscis. Indeed, the scales in this mosquito show a play of colours on every part as the angle of the light changes.

Pleurae brownish, clothed with tufts of white elliptical scales.

Scutellum clad with flat black scales, purple or rose-purple in a good light, on all the lobes; border-bristles brown.

Wings clouded, covered with dark brown scales, the lateral linear with square ends, the median also rather narrow; fork-cells moderately long; stem of the first sub-marginal cell about two-thirds the length of the cell; base of the cell nearer the base of the wing than that of the second posterior cell; the second posterior cell is a little broader than the first sub-marginal; median and supernumerary cross-veins meeting at an angle; posterior cross-vein rather short, distant about twice its length from the median.

Legs with the coxae pale; fore and mid coxae with brown and white scales, the hind with only white scales; femora pale scaled beneath, though on the fore legs there are dark scales

intermingled; the rest of the legs and upper surface of the femora clad with dark brown or purple scales, according to the direction of the light; there is no banding of the legs nor any suggestion of it. On the fore-legs there are a few yellow scales on the apex of the tibiae. The fore and mid ungues equal and uniserrated. Metanotum yellowish brown.

Halteres with pale stems and black and white scales on the knob.

Abdomen covered with broad purple-brown scales; no dorsal banding, though the white lateral band spots almost meet over the apices of the segments; laterally there are conspicuous white bands passing beneath upwards and backwards; these bands are shaped something like the mesial vertical section of an arm-chair; the scales forming them are bluish white (in dried specimens they may change to a dirty yellow).

♂. The lateral band of creamy scales on the head is broader than in the female. The vertical bristles are pale golden. Antennae pale brown, two last segments black and elongated. Plumes long, dense and purple brown. Proboscis distinctly enlarged for about one-third its length at the apex, black scaled. Palpi slender, longer than the proboscis, scaled entirely, save for a few white scales about the centre of the first apparent joint, with dark purple-brown scales. Fore and mid ungues unequal, the larger uniserrated.

Length.—4·5 mm.

Habitat.—Kuala Lumpur (Dr. Leicester)."

Observations.—This species can easily be told by the great length of the female palpi. I know of nothing approaching it in this group. The pale apical abdominal spots often spread out to form nearly complete bands. The type specimen sent me by Dr. Leicester does not show the pale scaled line up to the base of the wing on the mesothorax; probably the specimen had been slightly rubbed.—[F. V. T].

Genus **MACLEAYA.** Theobald.

The Entomologist, Vol. XXXVI., p. 154 (1903).

Head covered with flat scales over most of its surface, but with a median line of narrow-curved scales. Palpi short in the female, composed of three segments, with two basal constrictions;

apical segment minute, penultimate one large, swollen apically and truncated; the ante-penultimate broad apically, becoming narrower and swollen again basally, two basal constrictions looking almost like joints. The apex of the penultimate segment is studded with round spots. Palpi long in the male, longer than the proboscis, the two apical segments short, rather swollen, also the apex of the ante-penultimate; hair-tufts rudimentary.

Thorax with narrow-curved scales; scutellum with small flat scales on the median lobe, narrow-curved ones on the lateral lobes.

This genus comes near *Stegomyia*, but differs in having narrow-curved scales on the centre of the head and on the lateral lobes of the scutellum.

MACLEAYA TREMULA. Theobald (1903).

The Entomologist, Vol. XXXVI., p. 155 (1903).

Head silvery grey, with two large pronounced black patches; proboscis black, unbanded.

Thorax deep brown, with indistinct dull golden lines, the lateral ones over and in front of the roots of the wings curved, and white scaled prothoracic lobes; pleurae testaceous brown, with small white scales; scutellum brown with white and black scales to the median lobe, white to lateral lobes. Abdomen black, the segments with median basal and lateral basal spots, the middle creamy yellow, the lateral white; venter with basal creamy bands.

Legs black, the fore and mid with narrow white basal bands to the first and second tarsals; the hind legs with a broad white basal band to first, second and third tarsals, fourth tarsal all black, fifth all white. Wings transparent.

♀. Head black with flat black scales forming a large patch on each side, then a small grey patch, another small black one, and then more grey scales outside; the middle of the head with silvery white narrow-curved scales, and a silvery white line around the eyes; numerous small black upright forked scales over the occiput; palpi black with grey tips; clypeus and proboscis black; antennae black, the base of the second segment bright testaceous, the second segment with small grey scales.

Thorax deep brown, covered with very small narrow-curved bronzy-brown scales, with more or less pronounced irregular lines

of pale golden scales; the line over and in front of the root of each wing curved; the golden scales are broader than the dark ones; on each side in front is a short line of white scales and the prothoracic lobes are covered with similar coloured ones; in front of the scutellum are irregular (often indistinct) short lines of larger pale creamy scales, and some long backwardly projecting black ones; scutellum testaceous-brown, the mid lobe with small flat grey scales in the middle, black ones at the sides, the lateral lobes with narrow-curved whitish ones; border-bristles large and black, there are also very large black ones on the mesonotum; metanotum black; pleurae brown, with patches of flat grey scales.

Abdomen black, the segments with basal median creamy spots, and basal lateral silvery white ones; the last segment (sometimes the last two) without the median spot; first segment testaceous, with black scales; border-bristles jet black; venter white at the base, some of the segments with basal white areas, the apical segments black; genitalia white scaled.

Legs black, banded; coxae pale with patches of white scales, very long; femora black above, white ventrally; knee spot white; tibiae black; in the fore and mid legs the first tarsal and second tarsal segments have narrow white basal bands, last three tarsals black; in the hind legs the first, second and third tarsal segments have broad snowy-white basal bands, fourth tarsal all black, the fifth all white; ungues of all three pairs of legs equal and simple.

Wings with brown scales, the lateral scales long and thin; the first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem less than half the length of the cell, stem of the second posterior cell as long as the cell; posterior cross-vein longer than the mid, about one and a half times its own length distant from it; first longitudinal vein and the sub-costal densely scaled with large dark brown spatulate scales; fringe brown; base of the wing pale; halteres pale ochreous.

Length.—4·5 mm.

♂. Palpi black scaled, apical segments white, base of penultimate segment white, also apex of ante-penultimate, a small pale band about the middle of the long ante-penultimate segment, a few prominent black bristles on the last two segments, not forming regular hair-tufts, a distinct black spine at the apex of the ante-penultimate segment; the apical segment about half

the length of the penultimate; plume-hairs of antennae deep brown.

Thorax as in the female.

Abdomen narrow, brown, with either basal lateral white spots or basal white bands which spread out laterally; hairy.

Basal lobes of the genitalia broad and truncated.

Legs ornamented as in the female; fore and mid ungues unequal, the larger uniserrated; hind equal and simple.

Length.—4·5 mm.

Habitat.—South Queensland (Dr. Bancroft).

Time of capture.—February.

Observations.—Described from a series of dried and spirit specimens collected and bred by Dr. Bancroft. The larvae were taken in a fresh-water well near Dr. Bancroft's house at Bupengary. It does not appear to bite man.

The larvae were found with those of *S. notoscripta*, Skuse, and *C. fatigans*, Wiedemann.

It is a very marked species, easily told by the leg-banding, and the thoracic and abdominal ornamentation.

The thorax is subject to some variation, owing partly to denudation of the golden scales. The abdomen in the male is also variable, the lateral spots often merging so as to form complete basal white bands. Dr. Bancroft has recently written me that this species oviposits singly.

Genus **CARROLLIA.** Lutz MS.

Head with flat scales all over, except for a median basal area and numerous upright forked scales; scutellum with flat scales to the mid lobe and narrow-curved scales beneath and at edge, narrow-curved scales on lateral lobes; mesonotum with narrow-curved scales, rather large posteriorly; palpi of ♂ thin, acuminate, no hair-tufts, as long as the proboscis; ♀ palpi short.

Abdomen of ♂ with the segments deeply constricted basally. Vein scales dense, clavate.

Allied to *Catageiomyia*, Theobald, but can be told by the longer ♂ palpi, deeply notched abdomen beneath and by the cephalic, scutellar and wing squamose characters.

Dr. Lutz gave me a specimen under this generic name, but I do not think it has been described.

CARROLLIA IRRIDESCENS. Lutz MS.

Head yellowish-brown; thorax brown with some paler, almost golden scales behind, a pale slaty, frosty-grey nude area at the sides in front extending into the pleura with a dark brown line beneath and then the pale ochreous coxae; abdomen deep brown with basal creamy bands and large silvery white lateral spots, segments deeply constricted basally. Legs brown unbanded; mid femora swollen with two round pale spots.

♂. Head brown clothed with flat ochreous scales, palest in front between the eyes, dusky behind and at the sides, a few pale narrow-curved scales in the middle behind and bright

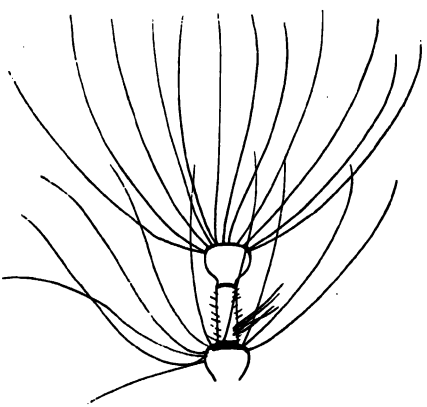


Fig. 54.
Antennal segments of ♂ *Carrollia irridescens.* Lutz.

ochreous upright forked scales, two large dark brown bristles on each side near the eyes, projecting forwards and inwards and two small ones between the eyes; palpi brown, thin, as long as the proboscis, a narrow pale band towards the base, the apical segment not quite as long as the penultimate, no hair-tufts at all; antennae grey, the segments swollen at the base of the long brown rings of verticillate hairs, there are also prominent short hairs on one side of the internodes forming an incomplete secondary verticillate area; basal segment bright ochreous; proboscis deep brown, a few long chaetae beneath at the base; clypeus deep brown.

Thorax deep shiny black with large narrow-curved bronzy-brown scales, which become paler, almost creamy on each side in

front of the scutellum; anterior chaetae brown, posterior golden brown; scutellum deep brown with flat creamy and dull scales on the mid lobe with a few pale narrow-curved ones beneath, narrow-curved creamy scales on the lateral lobes; four posterior border-bristles to the mid lobe; metanotum deep brown; pleurae nearly nude, a broad shiny bluish-grey area extending all the way along to the front of the mesonotum, then a deep brown line beneath, sharply contrasting with the pale ochreous coxae; the shiny pale area seems to be minutely pitted all over.

Abdomen deep brown with basal creamy white bands and large prominent lateral snowy-white spots, the penultimate one the largest and showing iridescent pale mauve reflections, the segments are all constricted basally, expanded apically below, and the scales on the apical areas are outstanding, giving a very characteristic appearance such as is seen in *Haemagogus*; posterior border-bristles of dorsum pale, of the venter longer and darker; there is no pale basal band to the first, second and last segments; the abdomen is also constricted basally and expanded towards the apex.

Legs brown with bronzy reflections, the fore and hind legs show faint traces of pale tarsal banding, the mid femora are swollen, have two prominent round pale spots and the venter of all the femora are pale; coxae pale ochreous; fore and mid ungues slightly unequal in length, the larger fore ungues with a very large tooth, the others simple, the hind equal, rather straight.

Wing scales broad and dense, especially on the fork-cells, the first sub-marginal much longer and a little narrower than the second posterior cell, its base much nearer the base of



Fig. 55.
Wing of *Carrollia irridescens*. ♂. Lutz.

the wing, its stem rather less than one-fourth the length of the cell; stem of the second posterior nearly as long as the cell; posterior cross-vein much longer than the mid, nearly twice its

own length distant from it; inner border of the wing curved inwards towards the apex.

Length.—5·5 mm.

Habitat.—Brazil.

♀. Like the ♂ but the abdomen broader, the venter with very broad basal brilliant silvery-white bands and narrow black apical ones. First sub-marginal cell considerably longer and a little narrower than the second posterior cell, its base nearer the base of the wing, its stem not quite half the length of the cell, stem of the second posterior nearly two-thirds the length of the cell; posterior cross-vein nearly twice its own length distant from the mid.

Halteres with pale brown stem and fuscous knob.

Legs as in the ♂, ungues, equal and simple.

Length.—5 mm.

Time of capture.—October (Dr. Goeldi), November (Dr. Lutz).

Habitat.—São Paulo (Dr. Lutz), Para (Dr. Goeldi).

Observations.—Described from two ♂'s given me under this name by Dr. Lutz, and from a ♂ and ♀ from Prof. Goeldi. It is a very beautiful species, the white lateral spots showing iridescent mauve in some lights. The marked constrictions and scale tufts on the apices of the segments ventrally are also characteristic.

Genus **GYMNOMETOPA.** Coquillett.*

Proc. Ent. Soc. Wash. VII. No. 4, p. 183 (1906). U.S. Dept. Agri. Bur. Ent. Tech. Sec. No. 11, p. 16 (1906).

Near *Stegomyia*, but the clypeus wholly bare.

Head clothed behind with broad appressed scales except a median stripe of rather narrow ones and narrow forked erect ones. Scutellum bearing both broad and narrow scales. Lateral scales on wing veins narrow. Palpi of ♂ about as long as proboscis, those of ♀ less than one-third as long.

The head resembles that of *Macleaya*, in which genus the scales of the mid lobe of scutellum are flat, on the side lobes narrow curved.

* This genus founded on *sexlineata* has been accepted on Coquillett's description. Time has not been found to examine the type species again. It is probably synonymous with *Macleaya*.

The larva of the type differs from *Stegomyia*, in having spreading tufts of rather long hairs, scattered over the body.

Coquillett tabulates the species as follows :—

1. Upper side of thorax brown-scaled and with six narrow lines of pale yellow scales extending the entire length of the thorax; last two segments of the hind feet black ...	*sexlineata.*	Theobald.
Upper side of thorax not marked like this ...	2	
2. Last two segments of the hind feet and all the tibiae black	3	
Last two segments of the hind feet chiefly white; a spot or band of white scales on the base of at least the first two segments on all of the feet; tibiae with a silvery mark at a point about one-fourth of their length	*mediovittata.*	Coquillett.
3. With a dot of silvery scales in the middle of the front end of the thorax; first two segments of the front feet white-scaled at their bases	*albonotata.*	Coquillett.
Without such a dot, front feet all black	*busckii.*	Coquillett.

GYMNOMETOPA MEDIOVITTATA. Coquillett (1906).

Stegomyia mediovittata. Coquillett (1906).

Canad. Entomo., p. 60, Feb. (1906); U.S. Dept. Agri. Bu. Ent. Tech. Series No. II., p. 25 (1906) (*Gymnometopa*), Coquillett.

"Proboscis black, unmarked; palpi black scaled, in the male the bases of the segments white scaled, in the female only the apices of the segments are white; inner side of first antennal segment white scaled, scales of occiput black, a median line of white scales, those on the sides yellow and white. Thorax brown scaled, a median line of white ones, which is divided into two branches on the posterior fifth of the mesonotum; on either side of this line is a stripe of dark brown scales, followed by a line of light yellow scales, which become whitish on the posterior portion of the mesonotum; a broadly interrupted line of white scales midway between this line and the insertion of the wing and a similar line just above this insertion, a spot of white scales on the humerus and several similar spots on the pleura; scutellum with a spot of white scales on each of its three lobes.

Abdomen black scaled with a bluish reflection, a spot of white ones near base of the sides of the last four segments and a few white scales at apex of last segment. Legs black scaled, a line of white ones on anterior and posterior sides of each femur, a spot above middle of anterior side of each tibia, the base of the first two segments of the front and middle tarsals and the base of each segment of the hind ones white scaled; tarsal claws of the female simple, those of the front and mid tarsi of the male with one tooth under one of the claws, none under the other, claws of the hind tarsi simple. Wings hyaline, the scales black.

Length about 3 mm.
San Domingo, West Indies.
Thirty-four specimens collected by Mr. August Busck."

GYMNOMETOPA BUSCKII. Coquillett (1906).

Stegomyia busckii. Coquillett.

Canad. Entomo., p. 60 (1906).

"Proboscis and palpi wholly black, no white scales on the first antennal segments, scales of occiput brown, a median stripe of yellow ones, the lower half largely yellow scaled. Thorax brown scaled, a median pair of widely-separated yellow scaled lines on the anterior three-fourths of the mesonotum, and between each of these and the adjacent wing is a line of similar scales on the posterior half, an interrupted line of white scales towards the sides of the mesonotum, and several spots on the pleura; scutellum brown scaled, and with a median stripe of white ones.

Abdomen black scaled, with a tinge of bronze; venter yellow scaled, and with a lateral spot of white scales on the last three segments.

Legs black scaled, those on under side of femora pale yellow, a dot of white scales at apex of each femur and tibia, bases of first three segments of the hind tarsi white scaled; tarsal claws in both sexes as in *mediovittata.*

Length about 3 mm.

San Domingo, West Indies.

A female and two males, collected by Mr. August Busck, after whom this handsome species is named."

GYMNOMETOPA ALBONOBATA. Coquillett.

Proc. Ent. Soc. Wash. VII., 4, p. 183 (1906).

Like *busckii*, the only apparent differences being the presence of a silvery dot in middle of front margin of mesonotum and a distinct white band at base of first two segments of front and mid tarsals and of each segment of palpus in the ♂. Santo Domingo, West Indies.

GENUS **POPEA.** Ludlow.

Canad. Entomo. Vol. XXXVII., p. 95 (1905).

Head covered with flat, forked, and slender curved scales, the latter occur only on the median line: palpi long and slender in the ♂; mesothorax with slender curved scales; scutellum with flat scales on the middle of each lobe, slender curved ones

between each lobe, and forming an apical border to all the lobes. Abdomen normal in form, bearing ventral median tufts of long clavate scales. Fork-cells small: wing scales of *Taeniorhynchus* type; ungues uniserrated in ♂.

This genus was founded by Miss Ludlow upon a very distinct species from the Philippine Islands. It clearly comes, as she says, between *Macleaya*, Theobald, and *Finlaya*, Theobald.

The genus is named in honour of Lieut.-Col. B. F. Pope, Deputy Surgeon-General of the U.S.A. Army, under whose directions Miss Ludlow's investigations were begun.

Popea lutea. Ludlow (1905).

Canad. Entomo. Vol. XXXVII., p. 96 (1905).

Head with median white line, a narrow yellow stripe on each side, then a broad brown stripe, then white.

Thorax brown scaled with yellow, brown, and white curved scales arranged in definite groups scutellum brown scaled in the middle, a line of yellow on each side, lateral lobes brown and with sulphur yellow scales between. Abdomen covered with yellow scales and a few dark brown, a broken median line of dark irregularly placed spots; well marked tufts of brown scales on middle line of venter. Legs mottled and spotted. Wings with broad yellow and brown scales, apex pale, and a yellow costal spot extending on to the wing field and other spots also; fork-cells very small.

♂. Head covered on median line with curved white scales, remainder of head with flat scales forming a narrow stripe of yellow next median line, then a broader brown area, then white; brown and yellow upright forked scales on occiput, white ones near vertex? antennae plumose light brown, light bands on each segment, a few flat dark scales on first segment, basal segment brown, a few flat white scales on median side; palpi long and slender, irregularly mottled with yellow, white, and brown scales, the tuft is small and light coloured, tip dark; proboscis rather heavily scaled, mottled yellow and brown, basal part brown, then irregularly deep ochraceous yellow, so that it amounts to a broad irregularly shaped band, apex brown.

Thorax brown, prothoracic lobes brown scaled, with yellow and white flat scales; mesonotum brown, covered with yellow, white, and brown curved scales arranged in indefinite groups; yellow, flat scales at the nape; pleurae dark brown, with patches

of white clavate flat scales; scutellum testaceous, the median portion of each lobe with flat, the interlobular parts and posterior border with rather closely placed slender curved scales; the flat scales on the median lobe are brown, with a line of yellow on each side, those on the lateral lobes are brown, the curved scales are light sulphur yellow, fine bristles on median lobe; metanotum brown, bare.

Abdomen light, covered with dark brown and yellow scales, mostly yellow; a broken median line of dark brown irregularly-placed spots—*i.e.*, sometimes apical, sometimes basal—extends the whole length of the abdomen, and the ultimate segment has an apical brown band, the broad yellow lateral stripe is occasionally broken by a few brown scales, but the effect is distinctly yellow; yellow apical, lateral and central hairs; venter yellow, white, and brown; there are well-marked tufts of long brown scales on the median line of the venter on most of the segments, but on the ultimate segment the tuft is yellow. These scales are clavate and not dentate. A few white scales appear in connection with the lateral (yellow) stripes, and the dorsal basal white band on the ultimate segment is largely of white scales. Claspers large, and there is a fan-shaped tuft of long yellow spatulate scales just besides them on the ventral side.

Legs all mottled; coxae and trochanters testaceous with white and brown scales, femora irregularly spotted with brown and white scales, a few yellow ones also occur; tibiae much lighter, and mostly yellow scaled, a few brown scales in small bunches giving the mottled look; tarsi mostly yellow scaled, on the hind legs there are tiny basal brown spots; in the fore and mid legs the brown scales are somewhat lighter and have no definite arrangement, but the last tarsal on the fore legs are mostly covered with these lighter brown scales. Ungues slightly unequal, both uniserrate, hind ungues equal and simple.

Wings very light and delicate and of a slightly yellowish cast, covered with broad yellow and brown median and lateral scales suggesting *Taeniorhynchus* scales; the ventral scales are, however, slender. The wing is apparently partly denuded, but the apex is light, and there is a well-marked yellow costal spot near the junction of the sub-costa and extending on the wing field to the third longitudinal in the vicinity of the cross-veins; there is a small yellow spot on the costa interior to this, and the costa is light continuously from the base of the wing nearly one-third its length; the fork-cells are small, nearly as small as those of

Uranotaenia, and the costa has spinous scales as in that genus; first submarginal cell is a little longer and narrower than second posterior cell; mid and supernumerary cross-veins meet and are about equal in length; posterior cross-vein is about same length as the others and distant from the mid nearly twice its own length, interior; basal cell is very long.

Halteres light, knob mostly yellow scaled.

Length.—5·5 mm.

Habitat.—Camp Stotzenberg, Angeles Pampanga, Luzon, Philippine Islands.

Time of capture.—September.

Observations.—Described from one perfect specimen sent by 1st Lieut. Eugene R. Whitmore, U.S.A. Caught in the woods and banana trees.

Further note.—This is a very remarkable species, and undoubtedly, as Miss Ludlow says, comes in a new genus between *Macleaya* and *Finlaya;* the unique sulphur yellow and brown colouring, the peculiar scutellar scaling and abdominal tufts and wing scales, and the *Uranotaenia* like fork-cells being very characteristic.

Genus **HOWARDINA.** Theobald.

Mono. Culicid. III., p. 287 (1903); Genera Ins. Fam. Culicid., p. 21 (1905).

In the previous description of this genus it was stated the scutellum had narrow-curved scales, these mostly occur in the centre of the mid lobe, the rest of the scutellum is mainly clothed with small flat scales, which are fewest on the lateral lobes, but form a dense layer on each side of the mid area of narrow-curved scales; there are a few narrow-curved scales on the lateral lobes also, most prominent in *Howardina aurites.*

Three species occur in the genus, as follows:—

a. Thorax with golden median lines.
Sides of thorax white *walkeri.* Theobald.
Sides of thorax golden..... *aurites.* n. sp.
aa. Thorax with one median golden line *greenii.* Theobald.

HOWARDINA WALKERI. Theobald (1901).

Culex (Stegomyia) walkeri. Theobald.

Mono. Culicid. I., p. 424 (1901); III., p. 287 (1903); Mosq. of Jamaica, p. 20 (1905), Theobald and Grabham.

The hind legs in the female, with a broad basal white band to the first, second and third tarsals, ungues equal and simple.

A fresh series sent by Dr. Grabham from Jamaica show no variations from the one described in Vol. III., but the hind legs which were partly missing are seen to be banded as above.

Life-history.—The mature insect appears in January, April and May, and is evidently uncommon in the island. It comes in the genus *Howardina*, which belongs to the *Culicinae*, and not to the *Aedinae*. It is called in Jamaica the Pine-wood Mosquito.

The following is Dr. Grabham's account of the various stages:—

"The larva assumes a nearly vertical position in the water when resting at the surface film. Colour of head and siphon is light brown, of thorax and abdomen very dark grey; latter have a thick appearance owing to the presence of large tufted hairs. The abdominal segments have a ring of tufted hairs, about eight in number, at the apex and base. One to seven segments have paired lateral simple hairs.

"Pecten of tube composed of a row (extending nearly whole length of tube) of simple, slightly-curved bristles, about twenty in number.

"Chitinous ring of the ninth segment not complete ventrally; a peculiar digitate hair at the postero-inferior border articulated by a ball-and-socket facet, and terminating in eight to ten bristles; this appears to be an extra swimming paddle. Both upper and lower brushes of hairs few in number; lower brush arises from a diamond-shaped plate of chitin situated between the extremities of the incomplete chitinous ring.

"Antennae have the lateral hairs at junction of upper and middle thirds, terminal hairs short.

"Lower lip of Meinert rather flat, of nineteen to twenty teeth. Lateral combs of eighth segment of seven to eight stout bristles, each springing from a strong base; bristles curved inwards towards the points,

"Tufted hairs of five to twenty flattened trichae arranged in a rosette,

"Siphon nearly in same straight line as first seven segments; eighth and ninth segments curved away, siphon twice as long as broad.

"Larvae very timid, hurrying to bottom of jar on the slightest

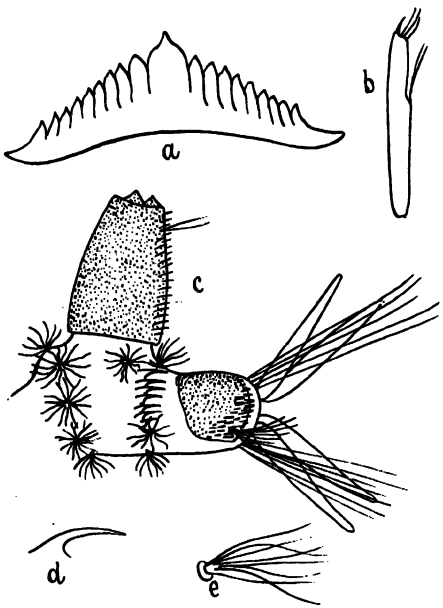


Fig. 56.

Larval characters of *Howardina walkeri*. Theobald (after Grabham).

a, Labial plate; b, antenna; c, siphon; d, scale of comb; e, digitate hair from posterior border of 9th segment.

provocation; avoid light, are always on dark side of bottle. Length of pupa stage is nearly four days.

"The *Bromelias* in which larvae have been found are: *Tillandsia utriculata*, L., and *Caragauta ligulata*, Lindl."

Economic importance.—Beyond biting slightly, little or no economic importance is attached to this uncommon species.

Howardina aurites. n. sp.

Head with golden scales in the middle and creamy ones laterally, with two median dark areas and two smaller lateral dark ones.

Thorax deep black with two median golden lines which unite to form one line behind, and another golden line on each side

running from the front to back of mesonotum; and a small golden-scaled area on each side.

Abdomen black with basal white spots and a few white basal scales.

Legs deep brown, fore and mid unbanded, hind legs with basal white bands to first and second tarsals only.

♀. Head deep brown with a median area of golden narrow-curved scales, then flat black ones forming a lateral line on each side, then flat golden scales shading into creamy-yellow with a small area of dark scales on each side bordering the eyes, a few small dark upright forked scales; proboscis deep brown, unbanded; palpi deep brown, a few creamy apical scales; antennae deep brown, basal segment deep brown, pale inside.

Thorax deep blackish with two parallel thin golden scaled lines in the middle uniting behind into one line, which widens out over the bare space in front of the scutellum; a thin golden line on each side running the whole length of the mesonotum ending at the scutellum, and a small golden-scaled area on each side of the mesothorax, the dark intervening spaces are scantily clothed with narrow-curved deep bronzy-brown scales; scutellum with narrow-curved golden scales in the centre of the mid lobe, small flat black ones at the sides, the lateral lobes with narrow-curved golden scales, mid lobe with three large posterior border-bristles; metathorax deep brown; pleurae brown with one large silvery spot.

Abdomen black, with basal silvery-white lateral spots and the last two or three segments with traces of basal white bands; venter with many pale scales, the last three segments with broad basal silvery bands.

Legs deep brown, pale at base and ventral surface of femora,



Fig. 57.
Wing of *Howardina aurites*. ♀. Theobald.

fore and mid legs unbanded, the hind with a basal white band to the first and second tarsals; ungues equal and simple.

Fork-cells small; first sub-marginal longer and narrower than

the second posterior cell, its base nearer the base of the wing than that of the second posterior cell, its stem about half the length of the cell; stem of the second posterior nearly as long as the cell; posterior cross-vein twice its own length distant from the mid.

Halteres pale.

Length.—4·5 to 5 mm.

Habitat.—Newcastle, Jamaica, W.I. (Colonel Loscombe).

Time of capture.—July.

Observations.—Two ♀s sent by Dr. Grabham, and collected by Colonel Loscombe. The species can at once be told from *Howardina walkeri* by its golden-scaled lines and sides and the hind legs having only two, not three, basal white bands.

HOWARDINA CHRYSOLINEATA. n. sp.

Head deep brown, pale behind and around the eyes; proboscis broadly pale banded. Thorax rich brown with a narrow median golden line, a shorter lateral one on each side and two curved ones at the sides behind. Scutellum dark with a median pale line. Abdomen deep brown, unbanded, with basal lateral white spots. Legs with basal pale bands on the mid and hind pairs.

♀. Head black with narrow-curved pale scales at the back and extending to the eyes, laterally the flat scales are black, except around the eyes where they are pale creamy-yellow and some white ones at the sides; upright forked scales black; proboscis pale creamy with a narrow dark basal band and a broad dark apical one; palpi black, pale scaled at the apex; two median pale bristles projecting forwards between the eyes, other bristles dark. Antennae deep brown, internodes hairy.

Thorax deep brown with small narrow-curved rich brown scales, a median thin line of golden scales, a short one on each side in front and two curved ones on each side behind just in front of the roots of the wings, where is also a small patch of pale scales; chaetae deep brown; scutellum pale brown with small flat dark scales, a median line of narrow-curved ones to the median lobe; four brown chaetae to the mid lobe of the scutellum; metanotum brown; pleurae deep brown with flat white scales.

Abdomen deep brown unbanded with basal white lateral spots, venter with basal white bands; posterior border-bristles pale golden.

Legs brown, coxae pale; fore legs unbanded, apex of femora and tibiae pale; in the mid legs a narrow pale band at the base

of the second tarsal; hind femora with a pale area near the base on one side; base of hind first tarsal with a narrow pale band, of second and third hind tarsals with broad pale bands; fore and mid ungues uniserrate, hind equal and simple.

Wings with the first sub-marginal cell longer and narrower than the second posterior cell, its base about level with that of the latter, its stem a little more than half the length of the cell; stem of the second posterior two-thirds the length of the cell; posterior cross-vein longer than the mid nearly twice its own length distant from it.

Length.—3 mm.

Habitat.—Pundabroya, Ceylon (E. E. Green).

Observations.—Described from a single ♀. It can at once be told from *H. greenii*, Theobald, by the lines on the thorax, unbanded abdomen and banded hind legs.

Genus **HULECOETEOMYIA.** Theobald.

The Entomologist, Vol. XXXVII., p. 163 (1904).

Head mostly covered with flat scales, but there is a pronounced median area of narrow-curved scales, which also exist along the nape and around the eyes. Palpi short in the female; in the male the palpi are long, but *shorter than the proboscis*, thin and devoid of hair-tufts; the apical segment about half the length of the penultimate. Scutellum with a rosette of flat and somewhat spindle-shaped scales to mid-lobe, scattered ones of similar form on lateral lobes; prothoracic lobes with small flat scales; fork-cells small.

This genus can at once be told by the cephalic characters, and by the scutellar scales, which, as pointed out by Dr. Leicester, differ entirely from those in *Stegomyia*. I have not yet detected any scales in the *Culicina* like those on the scutellum in this genus; they are somewhat difficult to make out in form, but apparently are all rounded apically, not pointed as in true spindle-shaped scales.

Two species have so far been taken. They might easily be mistaken for *Stegomyias* unless microscopically examined. Giles' *Stegomyia pseudotaeniata*, from Northern India, is the second species.

HULECOETEOMYIA TRILINEATA. Leicester (1904).

The Entomologist, Vol. XXXVII., p. 163 (1904).

Thorax rich brown, with three narrow golden lines, the median one entire, the lateral broken before the roots of the wings. Abdomen black, with pearly white lateral basal spots in the female, with narrow white bands in the male. Legs black, basally pale-banded, most prominently on the hind legs. Fork-cells short. Male palpi about four-fifths the length of the proboscis.

"♀. Head black, clothed with flat black scales and numerous upright black forked scales; there is a line of narrow-curved scales, creamy yellow in colour, running down the centre and along the orbital margins, and behind over the nape, scattered among the flat black scales, are a few white narrow-curved ones; laterally there is a patch of white flat scales succeeded by black scales, which are followed again by white scales; on the vertex, projecting forwards between the eyes, is a tuft of pale golden bristles; there are other bristles along the orbital margins which are black at the base and pale at the tip. Antennae with the basal segment dusky black, with small black spindle-shaped scales on its inner face (in some specimens this segment is ferruginous), remaining segments black; second segment black-scaled; verticillate hairs black; all the segments after second clothed with short silky white hairs. Clypeus black, frosted. Palpi yellowish-brown, of four segments; first segment constricted in the middle, fourth segment very small, clothed with black spatulate scales except towards the tip, which is white-scaled. The amount of this white scaling varies. In one specimen it includes little more than the last segment, in another one it includes half the penultimate segment. Proboscis yellowish-brown, black-scaled dorsally and laterally; beneath it is white-scaled; about half-way white scales appear laterally, and may even go right round, forming a complete band. Prothoracic lobes simple, prominent, white-scaled. Mesonotum dark brown, clothed with narrow-curved scales, black under a hand lens, but under a two-thirds power the tips appear pale golden; there is a central line of pale golden scales which forks in front of the scutellum, enclosing an unscaled area; on either side there is another line which runs back about one-third the total distance; placed a little further out is another line running forwards from the scutellum and

ending just a little to one side of the anterior lateral line; there is another golden line over the roots of the wings, and on the anterior margin, just above the prothoracic lobes, are scattered white scales; there are numerous black bristles arranged in lines. The scutellum is tawny brown; on the central lobe there is a patch of black almost spindle-shaped scales arranged in a rosette, with a central line of creamy white scales which become narrow-curved scales at the apex of the scutellum; the lateral lobes have a few black narrow-curved scales. The scutellum is not heavily scaled, and the scales are quite unlike those of an ordinary *Stegomyia*; there are four to six bristles on the central lobe, two of which are pale golden, four black. Pleurae dark brown, with patches of broad white scales. Wings clad with black scales; median scales rather long and narrow spatulate-shaped; lateral scales lanceolate; some white scales on the costa at its base. Fork-cells of moderate length; first sub-marginal longer and narrower than second posterior, its base nearer the base of the wing, the cell longer than its stem. Supernumerary and mid cross-veins meeting at an angle; posterior cross-vein twice its own length from mid cross-vein. Legs with the coxae creamy yellow; femora of fore and mid legs black-scaled dorsally and laterally, white-scaled beneath; a ring of golden brown spines around the apex; tibiae the same as femora minus the spines, except that the extreme apex is clothed with a few creamy yellow scales; first and second tarsal segments basally banded with creamy yellow, the remainder black-scaled; ungues equal and uniserrate; hind femora scaled as the others, except for a patch of white scales about the middle of the anterior and posterior surfaces; knee spot creamy; tibia entirely black-scaled, with four lines of short white spines running down its whole length; first tarsal basally banded; next two tarsal segments very broadly basally banded with creamy white. Ungues equal and simple. Metanotum dark chestnut-brown. Halteres with black-scaled stems and white-scaled knobs. Abdomen black-scaled; a few white scales at the bases of the segments after the second, but scarcely amounting to basal banding in some specimens; laterally there are triangular patches of white scales, and ventrally the segments are basally banded white.

♂. Head as in the female; the antennae have pale internodes and dark nodes; the two last segments are very long; verticillate hairs long and black; palpi about four-fifths the length of the proboscis, dirty white, black-scaled; a naked area

in the middle of second segment which shows white under a lens; white scales, may or may not form a complete band, at the apex of the second and third segments; these scales may involve both sides of the joint—they are variable. Proboscis long, black-scaled, with a narrow band of white scales about its centre. The thoracic scaling is the same as in the female, and the leg scaling also. Wing scaling similar but not so heavy. Abdominal banding more marked, all the segments showing fairly broad basal white bands and large lateral spots. The penultimate segment shows a dorsal patch of white scales with a pearly lustre. The fore and mid ungues large, unequal, larger tooth biserrate. Length, female, 5 mm.; male 4 mm.

Time of capture.—April.

Habitat.—Kuala Lumpur (Dr. Leicester)."

Observations.—The two types sent by Dr. Leicester are not quite perfect, having been damaged in transit. They were bred from larvae taken in bamboo jungle on the Pahang Road, about 5¾ miles from Kuala Lumpur. The thoracic adornment is so very marked the species cannot well be mistaken, for in *Macleaya tremula*, which it resembles, the golden scales of the mesothorax form but very indistinct lines, not clear narrow ones as in this species. Dr. Leicester's description of the scutellum must be modified, for the scales are certainly not of the usual spindle shape, but flattened on the mid lobe, much smaller and more irregular than in *Stegomyia* and with more rounded apices.

HULECOETEOMYIA PSEUDOTAENIATA. Giles (1901).

Stegomyia pseudotaeniata. Giles.

The Entomologist, Vol. XXXVI., p. 192 (1901).

This species comes well in this genus. It has been found in the following fresh locality: Dehra Dhoon (Capt. Thomson).*

* A series has just been received from Mr. Banks from the Philippine Islands.

Genus **PHAGOMYIA.** Theobald.

Genera Insect. Fam. Culicid., p. 21 (1905).

Head clothed with flat scales, except for a few scales along the nape. Scutellum with small flat scales on the mid lobe, narrow-curved ones on the lateral lobes.

Allied to *Stegomyia* but easily separated by the narrow-curved scales on the lateral lobes of the scutellum.

Two species are definitely known and possibly a third (*nigricephala*) belongs here.

1. *P. gubernatoris*, Giles, The Entom., p. 104 (1901) (Northern India). *Stegomyia gubernatoris*, Giles.
2. *P. irritans*, Theobald, Rep. Liverpool School Trop. Med., p. 3, App. (1901) (Bonny, West Africa).
3. *P.* (?) *nigricephala*, Theobald, idem, p. 4, App. (1901) (Bonny, West Africa).

Genus **POLYLEPTIOMYIA.** Theobald.

Genera Insect. Fam. Culicid., p. 21 (1905).

Head clothed with flat scales and with narrow-curved ones on the nape. Scutellum with spindle-shaped scales to the mid lobe, flat ones to the lateral lobes.

Allied to *Stegomyia* but told by the narrow-curved scales on the head and the scutellar scales.

A single species only occurs in the genus.

P. albocephala, Theobald, Mono. Culicid. Vol. III., p. 140 (1903) (Gambia).

Genus **PSEUDOHOWARDINA.** nov. gen.

Head clothed mostly with flat scales, but there is a small median area of narrow-curved scales, and a few of the latter forming a border around the eyes and along the nape. Palpi short in the ♀, long in the ♂. Scales of mesonotum are narrow-curved, also those of the scutellum.

Wings with vein scales resembling those of *Stegomyia*; fork-cells rather small.

This genus is founded on Coquillett's *Culex trivittatus*, which resembles to some extent *Howardina walkeri*, Theobald.

It is separated from *Howardina* by the fact that all the scutellar scales are narrow-curved ones, whilst some of those of *Howardina* are flat.

The cephalic characters resemble those of *Hulecoeteomyia*, Theobald, but the scutellar characters again separate the two genera.

PSEUDOHOWARDINA TRIVITTATA. Coquillett (1902).

Culex trivittatus. Coquillett.

Culicada trivittatus. Coquillett.

Ochlerotatus trivittatus. Coquillett.

N. Y. Ent. Soc. Journ. X., p. 194 (1902), Coquillett; Bull. 79, Ent. 22, N. Y. St. Mus., p. 333 and 319A (1904), Felt (*Culicada trivittatus*); Class. Mosq. N. and M. America Tech. Se. 11, p. 18 (1906) (*Ochlerotatus*), Coquillett.

Head brown, with ochreous median area; proboscis brown, unbanded. Thorax with a broad median brown stripe, a lateral broad pale creamy stripe on each side which meet in front behind the head. Abdomen deep brown, unbanded, with large basal lateral creamy spots. Legs unbanded, deep brown, base of femora pallid.

♀. Head deep brown, with a broadish creamy stripe of narrow-curved scales, the major area of head with flat scales,

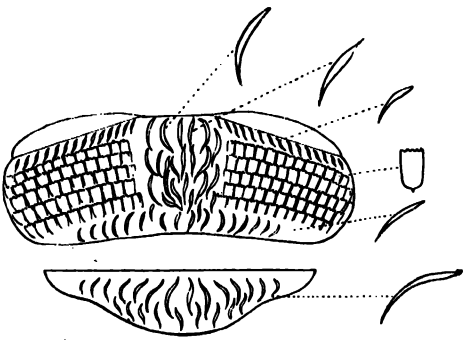


Fig. 58.
Cephalic and scutellar adornment of *Pseudohowardina trivittata*. ♀. Coquillett.

of a dusky creamy colour passing into brown, forming a dark spot on each side, very narrow-curved creamy scales forming a

border around the eyes; fork scales of mid area ochreous, those of lateral area dusky and brown; chaetae brown, except those between the eyes which are golden; palpi deep blackish-brown with long black chaetae: proboscis deep blackish brown.

Thorax deep brown, with narrow-curved scales, the median ones deep rich bronzy brown, forming a median dark broad stripe, the lateral ones pale creamy, forming broad lateral pale stripes which somewhat broaden out posteriorly and so narrow the median dark area; at the extreme sides of the mesonotum the scales become darker, rich brown; chaetae brown, rather short but long posteriorly; scutellum brown with narrow-curved pale creamy scales and deep brown border-bristles; metanotum almost black; pleurae deep brown, with patches of flat white scales and a few dull chaetae.

Abdomen brown, with deep brown scales showing violet reflections, and with large basal white triangular patches, extending some distance along each segment; border-bristles pale; venter entirely creamy scaled.

Legs deep brown, femora pale creamy at base and beneath; ungues all equal and uniserrated.

Wings with rather small fork-cells; scales very similar to *Stegomyia;* first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing, its



Fig 59.
Wing of *Pseudohowardina tricittata.* ♀. Coquillett.

stem more than half the length of the cell; stem of the second posterior cell as long or slightly longer than the cell; posterior cross-vein longer than the mid, not quite its own length distant from it.

Halteres with ochreous stem and pale-scaled knob.

Length.—4 to 5·5 mm.

Habitat.—Chester, Great Piece Meadow, South Orange, New Brunswick, in New Jersey; Bath-on-Hudson and Poughkeepsie, New York (Professor E. P. Felt); Illinois; Fort Sill, Okla;

Fort Leavenworth, Kansas; Westlawn Cem., Ohio (Miss Ludlow); Connecticut (H. L. Viereck).

Time of capture.—July, August, September (Smith).

Observations.—Described from specimens sent me by Professors Felt and Smith. It is a woodland species, so far not yet having been found indoors. Specimens have been taken in the northern part of New Jersey in July, August, and September. It is said to attack fiercely, especially below the knees, but no one seems to have been really bitten.

The larvae occur in woodland ponds, and have been found in

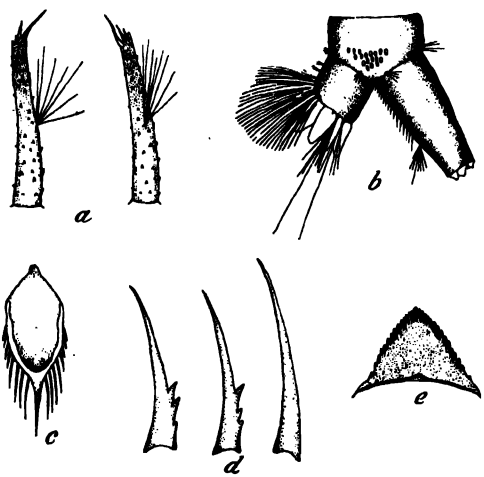


Fig. 60.

Larval characters of *Pseudohowardina trivittata*. Coquillett.

a, Antennae of larva; b, terminal segments and siphon; c, single 8th segment; d, siphonal spines; e, labial plate.

June, July, and August in New Jersey. In colour the mature specimens are dark grey, except head, siphon and anal segment, the former being yellow with large dark-brown blotches, the two latter dark brown; antennae short with many short broad spines, tuft of 8–10 hairs just below the middle; apex with one long spine, two short ones, and an articulating joint; mentum triangular, 15 small teeth on each side of apex; comb of eighth segment with 14–22 scales, each scale broad with a very acute apex and lateral spines decreasing towards the base; pecten of siphon of 13–18 spines in each row, toothed at the base except the terminal one; anal gills short and thick.

E. P. Felt placed this insect in his genus *Culicada*, but it bears no resemblance to the type of *Culicada* or the allied species.

It comes very near *Howardina* but must be placed in a new genus.

Genus **CULICIOMYIA.** nov. gen.

Head clothed with flat scales over most of its surface, and spreading around the eyes, a triangular area of narrow-curved scales in the middle, and at the base of the area at the back of the head; numerous long upright forked scales.

Scutellum with narrow-curved scales. Palpi short in the ♀; long and acuminate with scanty hair-tufts in the ♂.

Wings with moderate sized fork-cells, the scales of *Taeniorhynchus* like form but smaller.

Male genitalia very marked, the clasper has teeth on the outer edge of varied form, and there are large complex basal spines.

This genus may be easily told by the flat scales of the head spreading far on to its upper surface, and around the eyes and the wing scales. It resembles *Culex* in general appearance, but can at once be distinguished by the characters mentioned above.

Five species occur; two from Borneo and one from New Guinea and two from Africa.

They tabulate as follows:—

a. Abdomen unbanded.
 β. First sub-marginal cell longer than posterior *inornata.* n. sp.
 ββ. First sub-marginal cell no longer than posterior *ceylonica.* n. sp.
aa. Abdomen with basal and apical bands *annulata.* n. sp.
aaa. Abdomen with basal grey bands..... *pulla.* Theobald.
aaaa. Abdomen with apical grey lateral spots ... *freetownensis.* Theobald.

Culiciomyia inornata. n. sp.

Head greyish in some lights, brown in others; palpi and proboscis brown. Thorax reddish-brown. Abdomen brown, unbanded. Legs brown, unbanded.

♀. Head brown clothed with flat creamy and grey scales extending well on to occiput and around the eyes, some of these

show pale dull mauve reflections; a median area of narrow-curved pale creamy scales roughly triangular in form, the base being towards the nape and the apex coming between the eyes, numerous

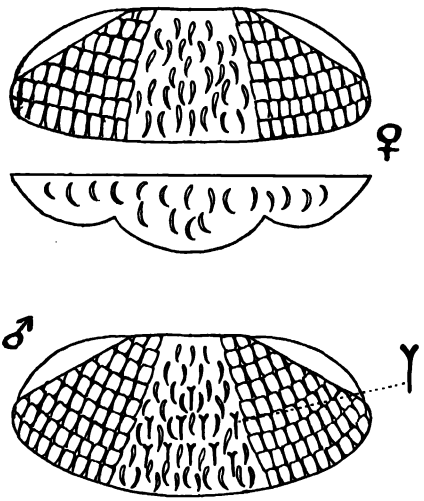


Fig. 61.
Culiciomyia inornata. Theobald.
Head of ♀ and ♂ and ♀ scutellum.

dark, thin, upright forked scales; chaetae rich brown. Palpi small, brown, also the proboscis. Antennae brown; basal segment brown, with minute hairs.

Thorax deep brown, with narrow-curved brown scales, appearing much darker under the microscope than with a hand lens, when they give the thorax a reddish-brown hue, some paler scales before the scutellum; chaetae brown; scutellum pale brown with narrow-curved pale scales, and eight brown border-bristles to the mid lobe; metanotum bright brown; pleurae brown and grey with some black chaetae.

Abdomen bright brown with deep brown scales showing dull violet reflection; first segment with a median patch of dark scales and long brown hairs; border-bristles brown; venter yellowish.

Legs brown, unbanded; femora rather swollen, ochreous ventrally; ungues all equal and simple.

Wings with rather short fork-cells; the first sub-marginal longer and narrower than the second posterior, its base about

level with that of the second posterior, its stem more than half the length of the cell; stem of the second posterior rather more than two-thirds the length of the cell; posterior cross-vein rather longer than the mid, about two and a half times its own



Fig. 62.
Wing of *Culiciomyia inornata*. ♀. Theobald.

length distant from it; the lateral vein scales, especially towards the apical half of the wing, dense and large, somewhat of *Taeniorhynchus* form.

Halteres with pale stem and fuscous knob.

Length.—4·5 to 5·5 mm.

♂. Palpi brown, acuminate, last two segments with scanty brown hair-tufts, a nude band towards the base appearing as a pale band; antennae with brown plume-hairs and long grey to white internodes.

Thorax, abdomen and legs as in the ♀.

Ungues of fore and mid legs unequal, the larger with a long tooth, the smaller with a small acute basal tooth, hind ones equal and simple.

Wings scaled as in ♀, but the scales fewer and rather shorter; first sub-marginal cell a little longer and somewhat narrower than the second posterior cell, its base slightly nearer the apex of the wing, its stem as long as the cell, stem of the second posterior longer than the cell which is widest at the border of the wing; posterior cross-vein longer than the mid, and about two and a half times its own length distant from it. The apical segment of palp about one and three-fourths longer than the penultimate.

Male genitalia very marked, the clasper arises from a prominence on the basal lobe, and is much contorted and spinose above one edge, and ends in a hook, the terminal segment is very thin and comes off laterally from the base of the hook, on the prominence arising from the basal lobe before the origin of the

clasper is a foliate plate, and from the apex of the basal lobe arises a large dark spine curved at the apex, three smaller sword-

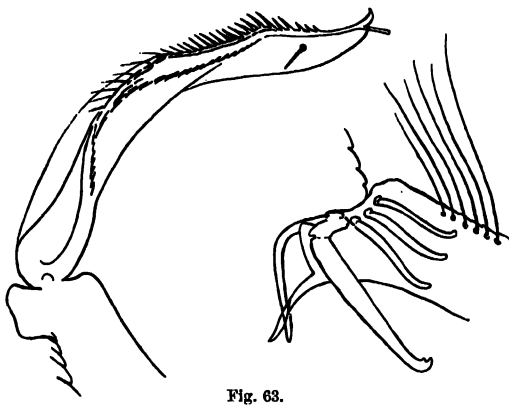


Fig. 63.
Male genitalia of *Culiciomyia inornata*. Theobald.

like spines and a ventral curved one and numerous other long chaetae.

Length.—5 mm.

Habitat.—Sarawak Kuching (Dr. A. J. S. Barker, P.M.O.).

Time of capture.—November.

Observations.—Taken at night in a house. Easily told from the other species with unbanded abdomen by the first submarginal cell being longer than the posterior cell. The ♂ genitalia are very peculiar, and also easily separate the ♂'s from those of the following species.

Culiciomyia annulata. n. sp.

Head brown, pale at the sides and around the eyes; palpi and proboscis brown. Thorax brown, unadorned. Abdomen brown with pale bands involving both sides of the segments venter yellow. Legs brown, unbanded, pale basally.

♀. Head brown, with pale creamy-grey flat scales extending well on to the occiput and around the eyes, with narrow-curved golden scales in the middle, deep brown upright forked scales behind, bright brown ones in front; clypeus brown; palpi brown with deep brown scales especially apically; proboscis deep brown; antennae brown; basal segment brown, base of second segment bright testaceous.

Thorax deep brown with narrow-curved dull golden-brown scales, golden chaetae in front, brown elsewhere; scutellum pale brown with narrow-curved pale scales and seven brown border-bristles to the mid lobe; metanotum pale brown; pleurae grey, with a prominent round black spot beneath the base of the wings.

Abdomen brown, the segments with narrow apical and broad basal yellow bands; posterior border-bristles pale; venter yellow.

Legs brown, unbanded, femora pale at base and beneath; ungues small, equal and simple.

Wings with rather short fork-cells; the first sub-marginal longer and narrower than the second posterior, its stem more than half the length of the cell; stem of the second posterior



Fig. 64.
Wing of *Culiciomyia annulata*. ♀. n. sp.

cell about two-thirds the length of the cell, its base about level with that of the first fork-cell; posterior cross-vein longer than the mid, about twice its own length distant from it; halteres pale, but with slightly dusky knob.

Length.—4 to 4·5 mm.

♂. Head much as in the ♀, but with denser upright forked scales, dark behind and ochreous in front; palpi pale brown acuminate, hair-tufts pale brown.

Thorax as in the ♀. The abdominal bands much wider, the apical portion being narrow, the basal very wide, often extending more than half across the segments. Fore and mid ungues unequal, uniserrate, hind equal and simple.

Wings with the first sub-marginal cell longer and slightly narrower than the second posterior cell, their bases nearly level, stem of the first sub-marginal about two-thirds the length of the cell; stem of the second posterior cell about three-fourths the length of the cell; posterior cross-vein longer than the mid, about its own length distant from it.

The apical segment of the palpi about one and a third longer than the penultimate, both with brown hair-tufts.

The clasper of male genitalia differing from the former species in having four large teeth towards its apex, beyond the finely spinose outer mass, apex hook-like, the terminal segment slightly expanded apically, with a dark median line; the clasper arises from the end of the basal segment on one side; instead of a foliate plate there is a broad thin plate with fimbriated border,



Fig. 65.
Male genitalia of *Culiciomyia annulata*.

and one very large dark curved spine with hooked apex, and three smaller sword-like spines, one larger than the other two.

Length.—4·5 mm.

Habitat.—Sarawak at Kuching (Dr. A. J. S. Barker, P.M.O.).

Time of capture.—November.

Observations.—Taken at night in a house with the foregoing. At once separated by the banded abdomen, the bands involving both sides of the segments. The male genitalia also separate the males very easily from that species. It looks like a small *Culex pipiens* at first sight.

CULICIOMYIA PULLA. Theobald (1905).

Culex pullus. Theobald.

Ann. Mus. Nat. Hung. III., p. 87 (1905).

Head deep brown, with tawny brown scales; palpi, proboscis and antennae deep brown. Thorax deep brown, densely clothed with reddish-brown scales. Abdomen deep brown, with grey

basal areas, the third and fourth segments with more or less triangular areas, the following with more or less complete bands. Legs brown, unbanded. Wings of typical *Culex* form.

♀. Head clothed with very small, narrow-curved, pale golden scales in the middle, and passing as a narrow area up to between the eyes; on the sides and spreading some way on to the occiput and around the eyes are flat dull grey scales, somewhat irregularly disposed, and a few black upright forked scales. Palpi small and thin, densely black scaled. Proboscis deep brown; clypeus brown; antennae deep brown, basal segment testaceous.

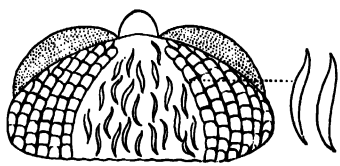


Fig. 66.
Culiciomyia pulla. ♀. Theobald.
Cephalic ornamentation.

Abdomen deep brown, a few pale scales in the middle at the base of the second segment, the base of the third and fourth segments with grey triangular spots, the other segments with grey basal bands; venter yellowish.

Legs uniformly brown with ochreous reflections, coxae and femora beneath ochreous; ungues equal and simple.

Wings with fork-cells moderately long, the first sub-marginal longer and narrower than the second posterior, its base nearer the base of the wing, its stem rather more than half the length of the cell; stem of the second posterior about two-thirds the length of the cell; cross-veins very pale, the posterior more than its own length distant from the mid. Halteres with yellow stem and slightly fuscous knob.

Length.—3 mm.

Habitat.—Muina, New Guinea (Biró, 1900).

Observations.—Described from a single perfect ♀. It resembles at first sight *C. fatigans*, Wied., but differs in (i) the small reddish-brown narrow-curved scales which are of quite different form to those in *C. fatigans*, and in the marked cephalic scale arrangement. The flat scales spread some way on to the top of the head in front, and are irregularly disposed, but the typical narrow-curved head scales of *Culex* are present even to the front just between the eyes, and cover most of the top of the head.

It can be told from the other two species in this genus by the pale grey basal abdominal bands.

CULICIOMYIA FREETOWNENSIS. Theobald (1901).

Culex freetownensis. Theobald.

Mono. Culicid. II., p. 69 (1901).

A fresh series of this species has been received from Captain Grattan, R.A.M.C., from Sierra Leone, both males and females.

It comes in the new genus described here (*Culiciomyia*).



Fig. 67.
Wing of *Culiciomyia freetownensis.* ♂. Theobald.

Both cephalic ornamentation and wing scales are seen to agree at once, and then on examination the strange male genitalia are found to place it definitely in this genus.

One specimen (♀) was taken sucking the blood from the ear

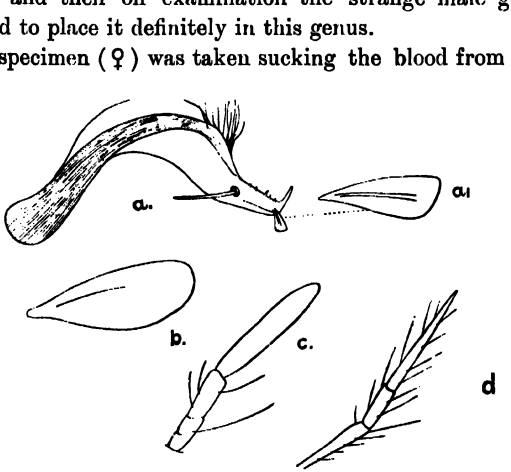


Fig. 68.
Culiciomyia freetownensis. Theobald.
a and a_1, Male clasper; b, foliate plate of ♂; c, female palp; d, apex of male palp.

and mouth of a frog, others in the barracks, hospital, and in the town during January and February.

Further details are given here, especially in regards to minute structure.

♂. The clasper of the male genitalia is curved with a thin lateral wing on the outer side at the curve, and a broader thin wing on the inner side; at the apical moiety of the outer wing is a tuft of blunt spines, and on the inner, more apically situated, is a single bristle arising from a prominent mamilla; the apex of the clasper has a blunt tooth at right angles, giving a hook-like appearance, and there are some minute processes between it and the tuft of blunt spines; the terminal segment is short and very broad, with a median rod and expands apically, and arises on one side near the hook-like extremity of the clasper; the foliate plate is broad and very concave on one side.

The male palpi are acuminate, the apical segment nearly three times as long as the penultimate, and with long scanty hairs. The fore ungues *are unequal*, not nearly equal as mentioned in Vol. II., but not so unequal in size as in the mid



Fig. 69.
Wing of *Culiciomyia freetownensis*. ♀. Theobald.

pair. The first sub-marginal cell is much longer and but little narrower than the second posterior cell, its base slightly nearer the base of the wing, its stem a little more than half the length of the cell; stem of the second posterior cell rather more than two-thirds the length of the cell; posterior cross-vein much longer than the mid, nearly twice its own length distant from it; scales of normal *Culiciomyian* form.

♀. The apical segment of the palpi longer than the rest of the organ, apparently composed of four segments, the basal two small.

CULICIOMYIA MINUTISSIMA. n. sp.

Head deep brown, paler around the eyes; proboscis long, unbanded. Thorax deep rich brown, showing traces of two darker areas in front. Abdomen brown with narrow dull yellow bands. Legs brown, unbanded. Very small—2 mm.

♀. Head deep brown with slaty grey flat scales at the sides and passing round the eyes, a few creamy ones in the middle in front, a large median triangular patch of long thin curved creamy scales and small black upright forked scales; chaetae black, except two reddish-brown ones which project forwards between the eyes; eyes black and silvery; palpi and long thin proboscis black; clypeus brown; antennae deep brown with testaceous basal segment.

Thorax brown, showing some darker longitudinal lines, and with scanty, small, narrow-curved, pale, dull golden scales and black chaetae, some very long ones over the roots of the wings; scutellum brown and testaceous, with narrow-curved pale scales and four brown chaetae to the mid lobe; metanotum rich uniform brown; pleurae brown and testaceous, some small flat pale scales; spiracle very large.

Abdomen brown, the first two segments unbanded, third showing traces of a basal pale band, fourth and fifth with basal white bands, remainder unbanded, lateral pale spots, the first two pale grey, the others creamy yellow.

Legs deep brown, unbanded; ungues equal and simple.

Wings with the fork-cells rather short, the first sub-marginal longer and narrower than the second posterior, its base nearer the base of the wing, its stem about half the length of the cell; stem of the second posterior about two-thirds the length of the cell; posterior cross-vein sloping backwards, twice its own length distant from the mid; halteres with dusky stem and fuscous knob.

Length.—2 mm.

Habitat.—Peradeniya, Ceylon (E. E. Green).

Time of capture.—February.

Observations.—A very small species, easily told by its size and abdominal ornamentation. The scutellum, having only four border-bristles to the mid lobe, gives it the facies of an *Aedine*, but it resembles in all other details *Culiciomyia*.

Culiciomyia ceylonica. n. sp.

Head large, black. Thorax pale dusky reddish-brown, with two parallel darker lines. Abdomen black, unbanded. Legs brown, unbanded. Fork-cells of equal length, base of first fork-cell nearer apex of wing than that of the second. Male palpi deep brown, unbanded; abdomen with false pale basal banding.

♀. Head large, black, clothed with flat dull pale violet scales, a few creamy ones around the eyes and a triangular basal median area of scanty dull creamy very small narrow-curved ones, brown upright forked scales and bright brown inwardly projecting chaetae in front; clypeus ochreous; palpi ochreous at base, deep brown scales elsewhere; proboscis deep brown; antennae brown, basal segment and base of second segment ochreous.

Thorax pale dusky reddish-brown, with pale narrow-curved scales and brown chaetae. In some lights it shows two median parallel darker lines; the scales become paler posteriorly and pass on to the pale scutellum, which has golden-brown posterior border-bristles, six to the mid lobe; metanotum chestnut-brown.

Abdomen deep brown, unbanded, some of the scales showing deep violet reflections and some paler scales laterally, border-bristles pallid.

Legs brown, unbanded, femora paler ventrally; femora and tibiae spiny, also the first tarsals; apex of femora and tibiae swollen; ungues equal and simple, small.

Wings with the fork-cells short, the first sub-marginal narrower but very little longer than the second posterior cell, its base nearer the apex of the wing than that of the second



Fig. 70.
Wing of *Culiciomyia ceylonica*. ♀. n. sp.

posterior cell, its stem not quite so long as the cell; stem of the second posterior also not quite so long as the cell; posterior cross-vein longer than the mid, not quite twice its own length distant from it.

Length.—3 mm.

♂. Head and thorax as in the ♀. Abdomen narrow, the last few apical segments showing traces of paler basal scales, scarcely forming bands, however; hairs brown.

Palpi deep brown, acuminate, the apical segment longer than the penultimate, both with longish brown hairs, no trace of

banding, somewhat swollen basally; proboscis deep brown; antennae brown with dark bands and hairs, basal segment ochreous.

Legs with fore and mid ungues unequal, uniserrate; hind equal and simple.

Wings with short fork-cells, the first sub-marginal longer and narrower than the second posterior, its base a little nearer the base of the wing than that of the latter, its stem as long as the cell; stem of the second posterior longer than the cell; posterior cross-vein about its own length distant from the mid.

Length.—3·3 mm.

Habitat.—Peradeniya and Maskeliya, Ceylon (E. E. Green).

Time of capture.—February and April.

Observations.—Described from a perfect female and male. It is closely related to *C. inornata*, Theo., but can easily be separated by the darker, larger head in the ♀ and by the base of the first fork-cell being nearer the apex of the wing than that of the second, and the thorax is also differently coloured. The male palpi have the apical segment markedly longer than the penultimate.

Genus **NEOMACLEAYA.** nov. gen.

Head clothed with flat scales all over except for a narrow median double row of narrow-curved ones, no upright forked scales; palpi short in the female. Thorax clothed with narrow curved scales, also the scutellum. Wings with short fork-cells, lateral vein-scales long, rather thicker than in *Culex*.

Closely allied to *Macleaya*, but there are no flat scales on the scutellum, and, to *Danielsia*, but the head scales do not agree in any way with those of the latter genus.

Neomacleaya indica. n. sp.

Head black with a narrow median creamy line; eyes black with a silvery edge near the head. Thorax deep brown, uniformly clothed with rich brown scales. Abdomen deep brown, with a basal white band to second segment, a white band near the base on the third and fourth, white lateral spots (not quite forming bands) on the remainder. Legs unbanded. Wings with short fork-cells.

♀. Head deep brown, clothed with flat black scales with dull

violet reflections and a median fore line with a single row of creamy-yellow narrow-curved scales on each side; palpi black scaled, slightly clavate; proboscis black; antennae brown, base of the second segment pale, the basal and second segment with some flat black scales. Black chaetae projecting inwards in front over the eyes.

Thorax deep blackish-brown clothed with an irregular mass of small narrow-curved rich golden-brown scales, appearing duller in some lights; dense black chaetae over the roots of the wings; scutellum with rather paler narrow-curved scales than the mesonotum and deep brown border-bristles; metanotum brown; pleurae brown.

Abdomen with the basal segment clothed with blackish scales and with golden-brown hairs; second segment with a basal white band; third and fourth segments with a white band near the base but separated from it by deep coloured scales, fifth with the band broken in the middle, the last segments with lateral white spots partly median, partly basal; border-bristles pale golden; venter with many creamy scales.

Legs deep brown; femora creamy white at base and beneath; fore and mid ungues equal, uniserrate.

Wings with the fork-cells very short, the first sub-marginal narrower and but very little shorter than the second posterior, its base nearly level with that of the latter, its stem as long as the cell; stem of the second posterior also as long as the cell; posterior cross-vein sloping backwards, rather more than its own length distant from the mid.

Halteres brown with grey scales on the outer sides of the knob.

Length.—5 mm.

Habitat.—India (Dr. Christophers).

Observations.—This insect at first sight resembles *Skusea funerea*. It cannot be mistaken, however, if placed under the two-third power. The head and scutellar squamose characters and the marked abdominal ornamentation at once will render its identification an easy matter.

Genus **DANIELSIA.** Theobald.

The Entomologist, Vol. XXXVII., p. 78 (1904); Gen. Ins. Fam, Culicid., p. 21 (1905).

Head covered with small flat scales, with truncated ends, loosely and rather raggedly placed on the head, a few long narrow-curved ones behind and small upright forked ones with them. Scutellum with small narrow-curved scales; mesothorax with narrow-curved scales. Palpi short in the ♀, densely scaled; in the ♂ as long as the proboscis, the two last segments short, the apical rather shorter than or equal to the penultimate, hair-tufts scanty. Fork-cells of wings rather short.

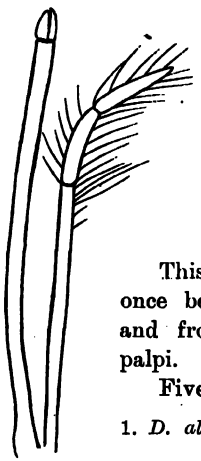


Fig. 71. Male palp and proboscis of *Danielsia*.

This genus comes near *Macleaya*, but can at once be told by the narrow-curved scutellar scales and from the allied *Catageiomyia* by the long ♂ palpi.

Five species of *Danielsia* are now known :—

1. *D. albotaeniata*, Leicester, The Entomo., p. 111 (1904) (Kuala Lumpur, Fed. Malay States).
2. *D. wellmanii*, Theobald, The Entom., p. 103 (1905) (Bihé, Angola).
3. *D. nigrescens*, n. sp. (Brazil).
4. *D. mediomaculata*, n. sp. (Para, Brazil).
5. *D. tripunctata*, n. sp. (Rio Grande, Brazil).

They tabulate as follows :—

α. Proboscis banded *albotaeniata.* Theobald.
αα. Proboscis unbanded.
β. Legs basally pale banded.
γ. Thorax deep brown, with a broad creamy area on each side, expanding in front and a short creamy median line..... *wellmanii.* Theobald.
γγ. Thorax with bright creamy grey scales..... *mediomaculata.* n. sp.
ββ. Legs with pale bands involving both sides of the joints..... *tripunctata.* n. sp.
βββ. Legs unbanded *nigrescens.* n. sp.

DANIELSIA ALBOTAENIATA. Leicester (1904).

The Entomologist, Vol. XXXVII., p. 111 (1904).

Thorax with the anterior half with shiny white scales, remainder brown, a lateral brown spot on each side of the silvery anterior area. Abdomen brown, with basal white bands. Hind legs broadly pale-banded basally; fore and mid with indistinct pale bands to the first and second tarsals.

♀. Head black with frosty tomentum. There is a bare line down the centre, with a few narrow-curved scales on either side of it. Outside this, behind and in front, between the eyes, the head is thickly clad with broad spatulate scales slightly brown-tinged. There is an oblong spot parallel with the orbital margin of broad black scales, laterally white flat scales, then another small spot of black scales. Behind these are numerous upright forked scales, mostly black, with a few light brown ones. On the apex, between the eyes on either side three bristles, light brown at the base, black at the apex, project forwards; more laterally there are three other bristles and then two.

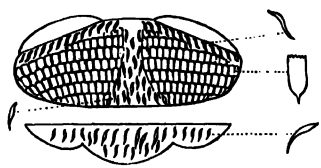


Fig. 72.
Cephalic and scutellar adornment of a *Danielsia*.

Antennae with the basal segment muddy brown with a dusky hue, clad with white scales on its inner surface; second segment muddy at its base, black at the apex, clad with longish black scales; remaining segments black, pale at the nodes, verticillate hairs black; silky-white hairs on the internodes. Palpi four-jointed, the two first segments round and small, the third somewhat swollen, the fourth longer than the third, fifth very minute and nipple-like, thickly covered with black scales, with a few long black bristles. Proboscis covered with black scales, except for one-fourth its length in the middle, clad with creamy scales. Clypeus rounded and black. Prothoracic lobes prominent, upper surface covered with broad white scales. Mesonotum dark brown. In front of the wing bases the mesonotum is entirely clad with silky white scales, except for a small notch of bronzy scales on either side. The white scaling has much the appearance of an inverted Y with a very thick stem, and there are white scales on the lateral margin. At the root of the scutellum is a

bare patch. On either side there are a few narrow white scales. The rest of the mesonotum is clad with bronzy narrow-curved scales. There is a row of bristles along the anterior margin of the mesonotum and over the roots of the wings.

Scutellum yellowish-brown; central lobe clad with white and black narrow-curved scales; lateral lobes with white curved scales; border-bristles ochraceous. Metanotum dark brown.

Wings of *Culex* type, clad with dark brown scales; the median scales rather long and narrow, the lateral scales long and narrow with square ends. Fork-cells moderately long; first sub-marginal longer but scarcely narrower than the second posterior, its base nearer the base of the wing; stem about two-thirds the length of the cell. Supernumerary and mid cross-veins meet at an angle. Posterior cross-vein about three times its own length from the mid cross-vein; fringe scales black.

Pleurae with seven patches of silvery-white broad scales arranged in two rows of three and one patch above the middle coxae.

Metanotum dark umber brown.

Legs with the coxae creamy, fore and mid legs pale yellowish, covered with black spatulate scales, except the under surface of the femora, which shows a line of white scales, the under side of the base of the tibia, the apex of the tibia, which is ringed with creamy yellow scales in the fore leg and the base of the first tarsal, and the second tarsal segment which in both legs show a white band; hind femora covered with black scales; a ring of white scales about one-third of the total length, extends around the whole circumference save for a narrow line on the dorsum; on the under surface of the apex some creamy yellow scales and a minute ring of the same placed just before the apex. Knee spot and under surface of tibia white scaled; a broad white band at the base of the first and three following tarsal segments. Fore and mid ungues equal and uniserrated. There are some pale golden bristles on all the tibiae.

Abdomen covered with black scales, with basal white bands which expand laterally into broad spots, especially large on the seventh and eighth segments. Segments beneath, brown scaled, basally white banded.

Length.—4·5 mm.

♂. Head black, frosted, clad almost entirely with broad flat white scales, parted in the centre over the occiput, leaving a bare line on the black head, showing broadest in front;

laterally there is an oblong patch of black scales which may almost disappear if the head shrinks much in drying; more laterally still a round patch of black scales.

Between the edge of the first patch and the orbital margin is a row of white narrow-curved scales; there are other narrow-curved scales on either side of the middle line just above the occipital foramen and a few on the vertex between the eyes. There are a moderate number of upright forked scales behind, and a few inserted amongst the black scales of the most median of the two black patches; they are dark brown in colour; there are five brown bristles on either side projecting forwards; in some specimens the median bristles are pale golden and white, and inwards more laterally there are three to five others. Antennae 15-jointed; the two last segments long and thin; basal segment dark dusky brown in the depression; a few narrow white scales on its inner face; remaining segments banded dark brown and white; the plumes dark silky brown tipped with white, except on segments seven to ten, where the plumes are pale yellowish brown.

Proboscis black scaled. Palpi scarcely longer than the proboscis, black scaled, the two last segments clad with pale glistening white hairs; the brown lateral spots on the thorax smaller than in the female.

Wings scaly, less dense, lateral scales being very few in number. Markings on legs similar to the female. Fore and mid ungues unequal, the larger tooth biserrate. Dorsum of the eighth segment of the abdomen covered with pearly white scales, pale golden hairs dense laterally on all the segments.

Length.—4·5 mm.

Time of capture.—April.

Habitat.—Kuala Lumpur.

Observations.—Dr. Leicester sent me this species with his description drawn up from fresh specimens They were taken as larvae in a bamboo jungle at Chang Road 5–5¾ miles from Kuala Lumpur. The insect much resembles the *Stegomyia nivea*, Ludlow, but can at once be told by the leg-banding and by the squamose characters as not being a *Stegomyia*. The female specimen shows only three posterior border-bristles to the mid lobe of the scutellum.

DANIELSIA WELLMANII. Theobald, (1905).

The Entomologist, Vol. XXXIX., p. 103 (1905).

Head creamy white, with two median black spots. Palpi and proboscis brown. Thorax deep brown, with a broad creamy area on each side, expanding in front and passing around the front of the mesonotum, and with a short creamy median line arising from the pale anterior area; numerous golden-brown bristles posteriorly. Abdomen black with basal white lateral spots on basal segments, becoming median on the apical ones. Legs deep brown, front pair unbanded, mid and hind with a broad basal pale band to the first and second tarsal segments.

♂. Head deep brown, with rather loosely applied flat creamy scales, with two large patches of flat dark scales above, and with creamy narrow-curved scales behind. Clypeus and proboscis black; palpi rather long, black; antennae black, with indistinct narrow grey bands.

Thorax black clothed with narrow-curved bronzy-brown scales, with a broad creamy-scaled area on each side, which expands anteriorly, and which meets around the front and sends a narrow short median line of creamy scales into the brown area; a few pale scales in front of the scutellum and numerous golden-brown bristles on the roots of the wings; prothoracic lobes with small flat creamy scales; scutellum with rather broad narrow-curved scales, narrowest on the lateral lobes; border-bristles bright golden-brown; mesonotum black; pleurae with white puncta.

Abdomen black, with deep violet reflections; the basal segments with basal white lateral spots, which become median on the last two or three segments, the latter having a few white scales extending on to the dorsum and in the middle, but not forming bands; border-bristles small, pale golden. Venter with basal white bands.

Legs deep blackish-brown, the front pair with only a faint trace of a pale band at the base of the first tarsal; the mid and hind with a broad white basal band to the first and second tarsals; fore and mid femora white beneath and at base; base of hind femora white and knee spot white. Ungues uniserrated, the tooth long.

Wings with the first sub-marginal cell longer and narrower than the second posterior cell, its stem nearly two-thirds the length of the cell; stem of the second posterior as long as the

cell; posterior cross-vein about twice its own length distant from the mid; lateral vein scales long and straight.

Halteres creamy.

Length.—4 mm.

Habitat.—Bihé, Angola (Dr. Creighton Wellman).

Observations.—Described from a perfect female. A very distinct species, easily told by the thoracic and abdominal ornamentation and leg banding. It clearly comes in this genus, but the scutellar scales are rather broader than in the type (*Danielsia albotaeniata.* Theobald).

DANIELSIA MEDIOMACULATA. n. sp.

Head pale creamy grey with a brown area at each side; proboscis and palpi dark brown. Thorax with bright creamy grey scales, almost silvery. Abdomen deep brown with a median pale area on each segment, uniting with one another to form a median pale line. Legs deep brown with narrow basal pale bands. Fork-cells of wings short. Male palpi brown, nearly as long as the proboscis.

♀. Head clothed with rather loosely appressed flat creamy scales, and then towards the eyes a broad line of brown ones on each side, around the eyes a rim of narrow-curved creamy ones and some narrow-curved ones behind in the mid region, a number of pale ochreous and brown upright forked scales behind; the occipital scales show a median parting and divergent opening in front; chaetae pale golden-brown; proboscis deep brown, also the short, thick palpi, which show bronzy reflections; antennae brown, base of second segment bright testaceous.

Thorax rich brown clothed with bright creamy narrow-curved scales rather irregularly disposed and with golden-brown chaetae; scutellum with similar scales and brown border-bristles; metanotum deep brown; pleurae brown with patches of flat pale creamy scales.

Abdomen deep blackish-brown, each segment with a median pale creamy area, which all unite to form a median pale line, and with basal lateral pale creamy spots; first segment pale testaceous with a median patch of creamy scales and two lateral patches of black scales, border-bristles pale.

Legs deep brown, femora pale at the base and beneath, the fore and mid legs bare, pale bands at the base of the first tarsals and involving the joints of the next two tarsals and to some

extent the third, in the hind legs the banding is more pronounced and extends to the last tarsal, which is dark apically; fore and mid ungues equal and uniserrate, hind equal and simple. The leg banding is mainly basal, but to some extent involves both sides of the joints—knee spots present.

Wings with short fork-cells; the first sub-marginal considerably longer and narrower than the second posterior cell, its base nearer the base of the wing, the cell about two and a half times



Fig. 73.
Wing of *Danielsia mediolineata*. ♀. n. sp.

the length of the cell; stem of the second posterior two-thirds the length of the cell; posterior cross-vein parallel with the mid, a little more than its own length distant from it.

Halteres thick, with pale stem and fuscous knob.

Length.—5 to 5·8 mm.

♂. Head scales paler, almost white, with two black patches and dark at the sides, scales and parting just as in ♀. Palpi deep brown, with a trace of a pale band towards the base, the two apical segments nearly equal and with dense brown hair-tufts, also on the apex of the antepenultimate segment; proboscis black, thin, just a little longer than the palpi.

Legs as in ♀; fore and mid ungues unequal, uniserrate, hind equal and simple. Claspers of the genitalia long with a long thin apical segment, *curved up over the back.*

Length.—5·5 mm.

Habitat.—Para, Brazil (Dr. Goeldi).

Observations.—Described from a perfect ♂ and ♀ sent in a collection by Professor Goeldi.

It is a very marked species, easily told by the median abdominal spots, which form a more or less pronounced median pale line.

The character of the ♂ genital claspers turning up also seems characteristic, and the banded legs at once separate it from the somewhat similar *albifasciatus* of Macquart.

DANIELSIA TRIPUNCTATA. n. sp.

Head creamy yellow; palpi and proboscis brown. Thorax brown with pale golden scales on the anterior region, brown on each side in front, deep brown ones behind. Abdomen deep brown with a median basal creamy elongate triangular spot on each segment and a small basal lateral one on each side. Legs with pale bands, except on last tarsal. Fork-cells of moderate length; stem of first sub-marginal one-third the length of cell.

♀. Head clothed with flat creamy yellow and ochreous scales, creamy narrow-curved ones behind and extending to some extent forwards in the middle line, dusky and ochreous flat ones at the sides, thin ochreous forked scales in front, thicker ones behind, with some dark brown and deep brown chaetae; palpi, clypeus, and proboscis deep brown; antennae deep brown, basal segment and base of the second segment deep testaceous.

Thorax deep shiny blackish-brown, clothed with narrow-curved long scales mainly directed backwards, those of the anterior region golden, except for a patch on each side in front, those on the basal half bronzy-brown, paler in front of the space in front of the scutellum; chaetae over the roots of the wings deep brown and black; scutellum deep brown with narrow-curved pale creamy scales; metanotum deep brown; pleurae brown with flat white scales.

Abdomen deep brown with creamy yellow median basal triangular patches which extend across the whole length of the antepenultimate segment and over most of the last two, a pure white basal spot on each side of the segments; basal segment ochreous with a median patch of flat scales white at base, a white row running to the edge of the segment, a black spot on each side of it, and long golden bristles; posterior border-bristles pale golden; venter pale creamy.

Legs brown, pale basally; in the front pair the first tarsals have a basal pale band and the rest pale bands involving both sides of all the joints; in the mid legs the bands are not so prominent and are absent on the last segment; in the hind legs the last segment is also apparently devoid of a band; fore and mid ungues equal and uniserrate, hind simple.

Wings densely scaled; first fork-cell longer and narrower than the second posterior, its base very slightly nearer the base

of the wing, its stem one-third the length of the cell; stem of the second posterior a little more than half the length of the



Fig. 74.
Wing of *Danielsia tripunctata*. ♀. n. sp.

cell; posterior cross-vein a little more than its own length distant from the mid.

Halteres broad and thick, stem pale, dark at the elbow and along one side and the knob fuscous.

Length.—5·5 mm.

Time of capture.—September.

Habitat.—Rio Grande (Dr. Lutz).

Observations.—Described from a perfect ♀ sent me by Dr. Lutz.

It resembles at first sight *mediomaculata*, but can at once be told by the particoloured golden and brown thorax, the tripunctate abdominal segments, and the longer fork cells.

Danielsia nigrescens. n. sp.

Head deep blackish-brown, paler in the middle and around the eyes; palpi, antennae and proboscis deep brown. Thorax deep brown with rich bronzy brown scales. Abdomen deep blackish-brown with basal white lateral spots and pale hairs. Legs deep brown, unbanded.

♂. Head black, clothed with small rather loosely applied dusky flat scales, somewhat paler in the middle, some dusky narrow-curved scales along the nape and black thin upright forked scales; proboscis deep brown; palpi longer than the proboscis, the last two segments and apex of the antepenultimate with black hair-tufts, the apical segment not quite as long as the penultimate, traces of a few pale scales at the base of the penultimate.

Thorax deep brown with small narrow-curved bronzy-brown scales and black chaetae; scales somewhat paler around the bare

space in front of the scutellum; scutellum brown with narrow-curved pale scales and deep brown border-bristles; metanotum deep brown; pleurae brown with some grey patches.

Abdomen deep blackish-brown with small basal white lateral spots; venter black scaled.

Legs deep brown, unbanded; fore and mid ungues unequal, the larger uniserrate, the smaller (?); hind equal and simple.

Wings with the fork-cells rather short, the first sub-marginal longer and narrower than the second posterior, its base nearer the base of the wing, its stem about one-third the length of the cell; stem of the second posterior about two-thirds the length of the cell; posterior cross-vein about one and a half times its own length distant from the mid; scales on the branches of the second, third and fourth veins rather thick and clavate.

Length.—4 mm.

Habitat.—Sto. Amaro, Brazil (Dr. Lutz).

Time of capture.—November.

Observations.—Described from a single perfect ♂ given me by Dr. Lutz. It very much resembles a *Melanoconion* at first sight, but can at once be told by the flat head scales.

There is no ornamentation save the small white basal lateral abdominal spots.

Genus **LEPIDOTOMYIA.** Theobald.

Gen. Ins. Fam. Culicid., p. 22 (1905), not *Lepidotomyia*, Theo. Ann. Mus. Nat. Hung. III., p. 80, 1905.

Head with flat scales all over except around the eyes where they are almost spindle-shaped and some narrow-curved ones behind, also upright forked scales. Scutellum with narrow-curved scales only. Palpi of the female rather long, scaly, those of the male with short hair-tufts. Fork-cells short. Proboscis short, not more than half the length of the body.

This genus comes very near *Danielsia*, Theobald, but the narrow spindle-shaped scales around the eyes and shorter proboscis separate it.

A single large species only is known.

This is not the same as *Lepidotomyia* mentioned in the Catalogue of *Culicidae* in the National Museum of Hungary, which referred to *Reedomyia*, Ludlow.

LEPIDOTOMYIA MAGNA. Theobald, (1905).

Genera Ins. Fam. Culicidae, p. 22 (1905).

Head black with a narrow white eye border and a few pale median scales; palpi of ♀ rather long and black; proboscis black. Thorax white in front, forming a solid white W, a small white triangular spot over the base of wings and white lateral spots. Abdomen black with basal white lateral spots. Fore legs black with a white apical tibial spot; mid legs with an apical tibial spot, first tarsals white with a black band towards apical half, apex of second tarsal and remainder black; hind legs with base and apex of femora white, tibiae black, base and apex of first tarsals with white bands, base of second tarsal with white band and a very minute one to second segment. Wings normal.

♀. Head black clothed with loose flat scales, black except around the inner border of the eyes where they are white and spindle-shaped, in the middle of the head are some flattish creamy scales in front, almost white, and over the whole numerous brown upright forked scales and narrow-curved scales behind; proboscis short, not more than half the length of the body, deep black and scaly. Palpi black scaled, rather long, the apical segment apparently very long (jointing hidden in scales). Antennae deep brown, the internodes pale.

Thorax black, the front with a solid W-shaped silky-white area of closely applied long scales, remainder black scaled, except a small white wedge-shaped area in front of the wings; pleurae with distinct white puncta.

Scutellum brown with black narrow-curved scales and a few white ones near the base, numerous long golden-brown border-bristles, which with those on the back of the mesonotum form a conspicuous mass.

Abdomen black with black scales and with lateral basal white patches, the apical segment with a basal white band; the first segment with numerous pale golden hairs and rather dense pale golden border-bristles, other segments with golden border-bristles but fewer in number.

Wings with typical brown scales, fork-cells short, the first sub-marginal longer and narrower than the second posterior cell, its stem nearly two-thirds the length of the cell; stem of the second posterior as long as the cell, bases of the fork-cells nearly level.

Halteres ferruginous with darker knobs.

Legs black banded with white as follows:—fore legs with a narrow apical tibial spot and a trace of a pale basal band to second tarsal; mid legs with an apical white femoral and tibial spot, first tarsal white with a black band on its basal half, a broad white band on base of second tarsal; hind legs with the basal two-thirds of femora white, an apical white spot; first tarsal with basal and apical white bands, base of second tarsal white, a very narrow basal band to the third tarsal; fore and mid femora bristly and all the tibiae bristly, bristles black; fore and mid ungues uniserrated, hind simple, all equal.

Length.—5·5 mm.

♂. Thorax as in the ♀; palpi black, the two last segments short, the apical one the smaller, both with short hair-tufts. Antennae with deep brown plume-hairs. Abdomen with the basal lateral spots nearly united to form basal bands; basal lobes of genitalia large and covered with black and creamy scales, claspers thin testaceous at base, black at the apex. Legs as in the ♀; fore ungues unequal, the larger uniserrated (the smaller?); mid unequal and uniserrated, hind equal and simple.

Length.—5·5 mm.

Habitat.—Bombay (Capt. James, I.M.S.).

Time of capture.—August (19. 8. 02).

Observations.—Described from two perfect specimens sent me some time ago by Captain James, I.M.S. It is a very marked species told at once by the leg banding and the prominent solid white W-shaped area on the mesonotum.

It presents a slight difference to the type of *Danielsia* in that there are spindle shaped scales around the eyes, these I could not detect in the type species *albotaeniata* (*mihi*) from Malay, they may easily be overlooked, however. The scutellar scales are rather broad for narrow-curved scales, but they more nearly approach that type than the spindle-shaped form.

Genus **GNOPHODEOMYIA.** Theobald.

Journ. Econ. Biol. Vol. I., No. 1, p. 21 (1905).

Head clothed with flat scales, rounded apically, with a band of a few narrow-curved scales behind and numerous upright forked scales. Palpi of female rather short, the penultimate segment longer than the basal ones, apical segment minute,

mammilliform. Thorax with very narrow-curved scales, also the scutellum; metanotum nude. Wings with normal venation, the scales on the apical area dense and large. Male unknown.

This genus comes near *Danielsia*, Theob. (The Entomologist, 1904, p. 78), but differs in the head scales being more uniform in arrangement, rounded apically, not truncated, and also in the scales of the wing.

GNOPHODEOMYIA INORNATA. Theobald, (1905).

Journ. Econ. Biol. Vol. I., No. 1, p. 21 (1905).

Head brown in some lights, greyish in others, palpi and proboscis brown. Thorax light brown, unadorned; pleurae reddish to dull brown. Abdomen deep blackish-brown with small basal lateral white spots. Legs deep brown; coxae, base and under side of femora reddish-brown. Wings with brown scales, not quite reaching to the apex of the body. Ungues small, equal and simple in the female.

♀. Head deep brown, clothed with flat scales with rounded apices, which are dull brownish-grey in some lights, violet-brown in others; behind, forming a band partly across the nape, are narrow-curved pale golden scales, and there are also numerous black upright forked scales and a few black bristles in front. Palpi brown with deep brown scales, short, apical segment minute, penultimate large; proboscis rather thin, clothed with almost black scales and with scattered short pale hairs; antennae deep brown; clypeus reddish-brown.

Thorax brown, rich brown in some lights, brighter in certain lights than in others, clothed with bronzy-brown narrow-curved scales and with long black lateral chaetae. Scutellum paler than the mesonotum, with narrow-curved bronzy-brown scales and six posterior border-bristles to the mid lobe (in two groups), a bare space between; metanotum deep brown; pleurae bright reddish-brown.

Abdomen clothed with violet-black scales and with small basal lateral white patches; posterior border-bristles pale, of two sizes.

Legs unbanded, deep brown; coxae, base and under side of femora reddish-brown. Ungues all small, equal and simple.

Wings not quite reaching the apex of the abdomen, with brown scales, costa darker; fork-cells of moderate length, the first sub-marginal longer but no narrower than the second

posterior cell, its base nearer the base of the wing than that of the second posterior cell; its stem from one-fourth to one-third the length of the cell; stem of the second posterior not quite as long as the cell; posterior cross-vein about one and a half times its own length distant from the mid cross-vein which unites with



Fig. 75.
Wing of *Gnophodeomyia inornata*. ♀. Theobald.

the supernumerary; scales on the first longitudinal, and on the branches of the second and fourth and on the third, rather broad and dense, some long lateral narrow ones on the base of the second, fourth and upper branch of the fifth. Halteres with pale stems and black knobs.

Length.—4 mm.

Habitat.—New Amsterdam (Dr. Rowland).

Time of capture.—July.

Observations.—Described from three females. One taken in a house in the morning, the others bred from larvae found in a hollow tree trunk at the side of a pond in Stanley Town, New Amsterdam.

Two specimens show the head scales darker than in the type.

Genus **PROTOMACLEAYA.** Nov. gen.

Head clothed with narrow-curved scales over most of the surface as in *Culex*, numerous upright forked scales behind and small flat lateral ones; palpi short in ♀; long in ♂, rather thin in the former sex. Mesonotum with narrow-curved scales; scutellum with small flat scales to the mid lobe, narrow-curved ones to the lateral lobes.

Wings densely scaled, the lateral vein scales straight, rather

thick, median vein scales larger, spatulate; on basal area of wing the scales are *Taeniorhynchus*-like.

Allied to *Macleaya*, Theob., but differs in having the *Culex* type of head and the wing scales different.

The genus is formed for Say's *Culex triseriatus.*

PROTOMACLEAYA TRISERIATA. Say (1822).

Ochlerotatus triseriatus. Say.

Culex triseriatus. Say.

Journ. Acad. Nat. Sc. Philadel. III., p. 12 (1822); Ausseurop. Zweiflug. Ins. I., p. 11, 19 (1828), Wiedemann; Mosq. N. Jersey, p. 272 (1904), Smith; Mosq. N. Y. Bull, 79, Ent. 22, p. 337 (1904), Felt; Class. Mosq. N. and M. America, Tech. Se. 11, U.S. Dep. Agri., p. 18 (1906) (*Ochlerotatus*), Coquillett.

Head grey, brownish behind; proboscis and palpi deep brown. Thorax rich brown in the middle forming an almost pear-shaped

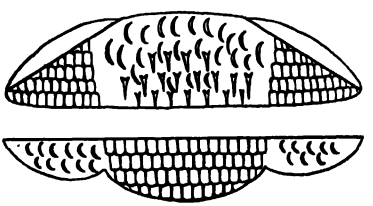


Fig. 76.
Head and scutellum of *Protomacleaya triseriata.* ♀. Say.

area, the broadest part posterior, sides silvery-grey. Abdomen brown with purplish tinge, with basal lateral triangular white spots. Legs deep brown, unbanded, femora pale at the base.

♀. Head deep brown, clothed with narrow-curved grey scales and numerous upright forked dull ochreous scales behind, flat grey lateral scales and black chaetae, except two golden brown ones between the eyes; proboscis deep brown, also palpi and antennae, the basal segment of the latter testaceous above.

Thorax deep brown, clothed with narrow-curved rich bronzy-brown scales in the middle, silvery-grey at the sides, the brown scaled area narrowest in front much widening out posteriorly, thus forming a rough pear-shaped area, the widest part posterior, a few pale scales before the scutellum, surrounding the bare space; rich brown chaetae, especially over the roots of the wings; scutellum brown with flat grey scales to the median lobe, narrow-

curved creamy-grey ones to the lateral lobes; metanotum deep brown; pleurae deep brown, with two large patches of flat white scales and two smaller patches.

Abdomen deep brown with rich violet iridescence and small basal lateral white spots, thin pale border-bristles; basal segment with a large median patch of dark scales, a few basal white ones and long pale hairs; venter mainly white scaled; the basal lateral spots show prominently on the venter.

Legs deep brown with violet and bronze reflections; base and under side of femora white, fore and mid ungues equal, uniserrate, hind equal and simple.

Wings densely scaled with long rather thick straight lateral vein scales and large spatulate median vein scales; first submarginal cell considerably longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem



Fig. 77.
Wing of *Protomacleaya triseriata*. ♀ Say.

rather more than one-third the length of the cell; stem of the second posterior more than half the length of the cell; posterior cross vein longer than the mid, about one and a half times its own length distant from it; halteres ochreous, with grey scales.

Length.—4 to 6 mm.

Habitat.—Pennsylvania (Say); Lahaway, New Brunswick, Chester, Lake Hopatcong, Newark & Warren County, Garret Mountain, Paterson, N. Jersey (J. B. Smith); Agricultural College, Mississippi (Prof. Glenn-Herrick); Ithaca, Albany (E. P. Felt), Poughkeepsie (O. A. Johannsen), New York; New Hampshire; Connecticut (H. L. Viereck); Pennsylvania; Maryland; Virginia (L. O. Howard); Augusta Arsenal, Georgia; Fort Snelling, Minnesota; Jefferson Barracks, Montana; Rock Island Arsenal, Illinois; Westlawn Cem, Ohio (Miss Ludlow).

Time of capture.—May (Professor Glenn-Herrick); April, June, August, October (J. B. Smith).

Observations.—This species is re-described from specimens

sent me by Felt, Ludlow and Glenn-Herrick. It is very marked, the silvery-white sides to the grey dorsum of thorax, black abdomen with lateral white spots and dark unbanded legs at once separating it.

It is essentially a sylvan species, and winters in the egg stage either at the bottom of water, or in depressions where water will collect in spring.

It comes in a new genus near *Macleaya*. One specimen sent me by Professor Glenn-Herrick shows the scutellar scales rather dusky.

Prof. J. B. Smith (p. 274) first records it in June in the adult stage, and on as late as October in New Jersey. It bites hard and very readily, and comes into porches of houses surrounded by trees. Although common it is not considered a pest.

The *larva* is about 8 mm. long, but may reach 10 mm.; colour brownish or greyish with dark head and siphon; antennae long

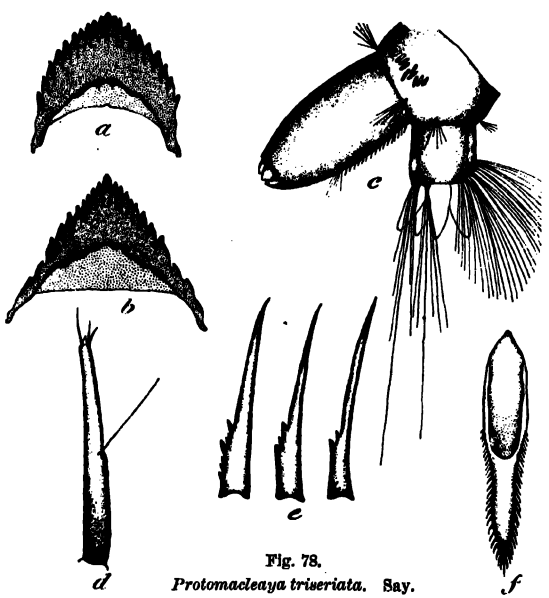


Fig. 78.
Protomacleaya triseriata. Say.
Larval characters.
a and b, Variations of labial plate; c, terminal segments and siphon; d, antenna; e, siphon spines; f, scale of 8th segment (after Smith).

and straight, not spiny, one long lateral hair just near the middle, apex with one long and two short spines, and a small

articulating segment; mentum triangular, 10–11 teeth on each side of the apex; comb of eighth segment composed of 8 to 13 scales arranged in a single irregular row on each side, scales elongated and fringed with short hairs at sides and apex; siphon short and thick with the two rows of the spines 15 to 21 in each row, each spine has a few small teeth basally on one side; anal gills short.

It is easily identified by its unusually long form. They seem to be normally found in holes in tree stumps where water collects. The larva approaches that of *Stegomyia fasciata*.

Dr. Dyar states that the female deposits her eggs singly or in patches at the edge just below the surface of the water, and there they remain until spring.

American observers have identified Say's species, I presume from the type, but in none sent me has the thorax been *dark blue*, and I therefore do not feel at all sure that this is what Say described originally.

In consequence I append Say's description :—

"Body brown; thorax rather dark blue, with white hairs on either side; pleurae with two white, hairy spots; abdomen with a triangular white spot on either side of the base of each segment; these spots correspond with bands across the belly, which are twice interrupted, so that each band shows three spots, on each segment, the middle spots forming a sort of stripe along the belly. Legs yellowish, with brownish hairs; femora naked, blackish above, at the apex. 2¼ lines."

Genus **REEDOMYIA.** Ludlow.

Canad. Entomo., 1905, Vol. XXXVII., p. 94 (1905).

Head densely covered with slender curved scales and flat lateral ones, and numerous upright forked scales. Palpi short in ♀, long in ♂.

Thorax with narrow-curved scales. Scutellum with flat scales, usually shiny white or silvery. Miss Ludlow says that the prothoracic lobes appear to be stalked, the stalks running in a curve up the cephalic aspect of the thorax and the lobes end in a kind of cap, reminding one of a mushroom.

Fork-cells rather short; scales rather broad and truncated; costa slightly spinose.

Male genitalia very marked; claspers with narrow stem and large swollen apex, with a mass of chaetae on one side (fig. 81).

Five species are now known :—

1. *Reedomyia pampangensis*, Ludlow, Canad. Ent. XXXVII., p. 94 (1905) (Philippine Islands).
2. *R. niveoscutella*, Theobald, Journ. Eco. Biol. I., p. 22 (1905) (India).
3. *R. alboscutella*, Theobald, Ann. Mus. Nat. Hung., p. 80 (1905) (New Guinea).
4. *R. albopunctata*, n. sp. (Sierra Leone).
5. *R. biannulata*, n. sp. (Sierra Leone).

These species tabulate as follows :—

Legs unbanded, apex of femora white.
 Thorax adorned with dark and yellow scales *pampangensis.* Ludlow.
 Thorax adorned with four creamy spots *alboscutella.* Theobald.
Legs unbanded, apex of femora not white.
 Thorax unadorned *niveoscutella.* Theobald.
Legs with a white band at apex of femora and tibiae *biannulata.* n. sp.
Legs with tarsi banded.
 Last hind tarsal white..... *albopunctata.* n. sp.

REEDOMYIA PAMPANGENSIS. Ludlow (1905).

Canad. Entomo., Vol. XXXVII., p. 94 (1905).

♀. Head densely covered with slender curved scales and flat lateral ones; a broad triangular median spot bordered by a white stripe, followed laterally by brown scales, and then by lateral white flat scales, and a border of light yellow curved scales around the eyes, fork scales numerous; basal segment of antennae light brown with some brown scales, first segment also with a few brown scales; palpi brown; proboscis brown dorsally, fawn coloured ventrally to about three-fourths of its length, apical quarter black, tip brown.

Thorax reddish-brown to dark brown, according to the light; prothoracic lobes with slender curved white scales; mesonotum light reddish-brown with light yellow and dark brown slender curved scales rather indefinitely arranged—an indefinite white band across the cephalic end—a narrow indefinite light lateral band extending half-way to wing joint, and a small spot dorsal of the end of this line, but markings very indefinite, general effect being a reddish-brown, sparsely covered with an irregular arrangement of dark and yellowish scales; *scutellum light brown,*

all three lobes densely covered with broad flat white scales; six large bristles on the mid lobe.

Abdomen light, covered with flat brown scales and many golden apical hairs, with now and then a suggestion of narrow white basal bands, and with distinct white basal lateral spots; venter partly white scaled, but with brown apical bands.

Legs, with white scaled coxae; femora pale at base, rest brown scaled dorsally, pale ventrally, a brilliant white apical spot; tarsi brown. The legs are rather prominently pale bristled throughout, which even suggest, with a hand lens, light spots on the hind tibiae; fore ungues large, equal, uniserrated.

Wings clear yellowish, covered with dark brown scales, except a small spot at the very base of the costa, which is brilliant white. Fork-cells short; scales rather broad and truncated, costal edge shows some tendency to the spinose scales seen in *Uranotaenia;* first sub-marginal about one-sixth longer, and the same width as the second posterior cell, the stems of each about the same length, and about two-thirds as long as the cells; mid and supernumerary cross-veins meet, and are nearly equal, posterior cross-vein a little shorter and distant twice its own length from the mid.

Halteres light with dark knob.

Length.—4 to 5 mm.

Habitat.—Angeles, Pampanga, Luzon, Philippine Islands.

Time of capture.—September.

Observations.—Miss Ludlow described this species as a new genus which is very distinct. The specimens were sent her by Dr. Eugene R. Whitmore, marked "Caught in the woods and in the quarters."

REEDOMYIA NIVEOSCUTELLA. Theobald (1905).

Journ. Econ. Biol., Vol. I., No. 1, p. 22 (1905). ♀.

Head ochreous brown; proboscis fawn coloured, dusky at the tip. Thorax with dull golden scales with two dull brown median bare lines; scutellum with flat silvery-white scales looking like three silvery spots; pleurae pallid with three patches of white scales. Abdomen deep brown with indistinct basal grey bands. Legs unbanded.

♀. Head ochreous brown, clothed with pale creamy narrow curved scales, paler around the eyes, with narrow ochreous

upright forked scales in front and broader dusky ones behind, the sides with ochreous flat scales.

Proboscis fawn coloured, slightly dusky at the tip. Palpi thin, testaceous with irregular dusky scales. Clypeus fawn coloured. Antennae brown, testaceous at the base, with a few small flat dusky scales on the last two segments. Thorax brown; clothed with narrow-curved rather dull pale golden scales and with golden-brown and brown bristles; scutellum pale ochreous, clothed with small flat silvery-white scales (in some lights they appear dull grey), border-bristles brown, six large and four small ones posteriorly to the mid-lobe; metanotum brown, with grey tomentum; pleurae very pale ochreous with three irregular patches of grey scales.

Abdomen deep brown with dull violet reflections, the segments with narrow basal creamy bands and traces of pale scales apically and pallid border-bristles; lobes of female genitalia dark, prominent and acuminate.

Legs unbanded, brown, with coppery reflections; coxae and base and under side of femora pallid; fore and mid ungues equal and uniserrated.

Wings with rather short fork-cells; the first sub-marginal much longer and slightly narrower than the second posterior cell, its stem nearly equal to the length of the cell; stem of the second posterior as long as the cell, posterior cross-vein rather more than its own length distant from the mid cross-vein. Halteres pallid.

Length.—4·5 mm.

♂. Head, thorax and scutellum as in the ♀.

Abdomen showing only a few pale basal scales of a dull ochreous hue; border-bristles pale golden-brown; genitalia with thick, densely hairy basal lobes, hairs bright golden-yellow; claspers very peculiar, consisting of a narrow stem and a large round, swollen apex with a mass of chaetae on one side; on the lower surface of the apical segment there projects on each side a long curved tuft of golden hairs. Palpi long and thin, brown, last two segments about equal length, the apical one bluntly acuminate, a few longish hairs on both, and on the apex of the ante-penultimate segment; proboscis ochreous except at the apex, where it is dark brown. Fork-cells of wings very short, about the same length; the first sub-marginal narrower than the second posterior cell, their stems much longer than the cells.

Fore and mid ungues unequal, both uniserrate and hairy on their basal halves.

Length.—4·5 mm.

Habitat.—India (Capt. James, I.M.S.).

Observations.—Described from a perfect female. The ♂ is described here for the first time. In general appearance it resembles a typical *Culex* of the *pipiens* group. It is closely allied to *Reedomyia pampangensis* (Ludlow), found at Angeles, Pampanga, Luzon, Philippine Islands, but can at once be told by the uniform coloured thorax, which in *pampangensis* is ornamented with pale yellow and dark bronzy-brown scales and slightly different venation. The flat white scales of the scutellum in both species are very marked. The male genitalia are peculiar.



Fig. 79.
Male fore ungues of *Reedomyia nivescutella*. Theobald.

REEDOMYIA ALBOSCUTELLA. Theobald (1905).

Lepidotomyia alboscutellata. Theobald.

Ann. Mus. Nat. Hung. III., p. 80 (1905).

Head brown, with golden and brown scales; proboscis and palpi deep brown. Thorax bright brown with small scattered bronzy scales and with four creamy-scaled round spots; scutellum densely silvery-white scaled; pleurae pale brown with white spots. Abdomen deep brown, unbanded; pale ventrally. Legs deep brown, apices of mid and hind femora with a silvery-white spot. Wings with deep brown scaled veins.

♀. Head brown, with narrow-curved, golden-brown scales over the greater part, some small flat creamy ones at the sides; over the occiput numerous thin upright forked scales; black bristles projecting forwards, especially two prominent ones between the eyes. Clypeus, proboscis and palpi brown; antennae brown, the basal segment testaceous.

Thorax bright reddish-brown, with four small golden-scaled spots, two close to the head and with numerous scattered small narrow-curved bronzy scales, bristles black; scutellum densely clothed with flat silvery-white scales and with black border-bristles; metanotum brown; pleurae bright brown with three silvery-white spots, composed of flat scales.

Abdomen black, unbanded with golden border-bristles; venter with broad basal creamy bands.

Legs brown, the front pair uniform, the mid and the hind with the apices of the femora and tibiae pure silvery-white; fore and mid ungues equal, uniserrated, hind equal and simple.

Wings with the fork-cells nearly equal in size, the first sub-marginal slightly longer than the second posterior cell, its stem about two-thirds the length of the cell, about the same length as that of the second posterior cell, the stem of which is about two-



Fig. 80.
Wing of *Reedomyia alboscutella*. ♀. Theobald.

thirds the length of the cell; bases of the cells nearly level, that of the first sub-marginal if anything slightly nearer the apex of the wing; posterior cross-vein about its own length distant from the mid. Halteres with dull stem and fuscous knob.

Length.—4 to 4·5 mm.

Habitat.—New Guinea, Simbang, Huon Gulf (Biró), 1898, and Friedrich-Wilhelmshafen (Biró), 1900.

Observations.—Described from two ♀'s. It is a very distinct species easily told by the silvery-white scaled scutellum and the two silvery-white apical spots on the mid and hind femora and tibiae. The cephalic scales in one specimen are much brighter golden colour than in the type, which is in the National Museum of Hungary.

Reedomyia albopunctata. n. sp.

Head greyish-brown in the middle, with a black and white patch at the sides. Proboscis unbanded. Thorax with rich brown scales with six white puncta, the two anterior nearer together than the second pair; scutellum white scaled, duller scales in the middle. Legs with prominent basal white bands, last hind tarsal white.

♀. Head brown, clothed in the middle with narrow-curved

pale greenish-brown scales and upright forked scales, small flat yellowish-brown, then black, then silvery-white scales; paler around the eyes; chaetae black; antennae and proboscis black, the latter with some dull ochreous scales above in the middle; palpi black scaled with apical white scales and a narrow white band beneath; swollen apically. Basal segment of antennae with grey sheen on the summit; clypeus dark brown with some small flat grey scales.

Thorax deep brown, with narrow-curved rich brown scales, six silvery-white puncta, the two anterior close to the head, the mid and posterior further apart; some grey scales before the scutellum; scutellum with flat silvery-white scales; pleurae deep brown, with patches of flat white scales.

Abdomen deep blackish-brown, with basal white bands, no lateral spots; border-bristles brown. Venter deep brown with irregular white scales.

Legs with femora deep blackish-brown, with scattered grey scales and a prominent white ring towards the apex; tibiae dark with a white band towards the basal half of the fore pair, in the middle of the mid and hind legs; anterior and mid legs with the first tarsal and next two tarsals with basal white bands, the hind with broad white bands to all the segments, except the last, which is pure white; fore and mid ungues equal and uniserrate, hind equal and simple.

Wings with dense brown scales, the lateral ones moderately thick; fork-cells short, the first sub-marginal a little longer and much narrower than the second posterior cell, its base nearer the base of the wing, its stem not quite so long as the cell; stem of the second posterior longer than the cell; posterior cross-vein rather more than twice its own length distant from the mid.

Length.—3·5 mm.

Habitat.—Sierra Leone (Major F. Smith, R.A.M.C.).

Observations.—Described from ♀'s collected by Major F. Smith which show some variation in regard to the number of white scales on the legs, but the species can at once be identified by the band on the tibiae.

REEDOMYIA BIANNULATA. n. sp.

Head brown; palpi of ♂ brown; proboscis unbanded. Thorax rich bright brown; scutellum silvery white. Abdomen deep brown with basal white bands and lateral basal spots. Legs

deep brown, apex of femora and tibiae white banded, especially marked on hind legs ; tarsi unbanded.

♂. Head brown, small, with dull golden-brown narrow-curved scales in the middle, small dusky flat ones at the sides ; palpi, proboscis, clypeus and antennae deep brown ; palpi as long as the proboscis, thin, two last segments slightly swollen, with long brown hairs, apex of ante-penultimate segment swollen with long brown hairs on one side, no definite hair-tufts, however ; last two segments nearly equal.

Thorax uniformly brown, with narrow-curved brown scales ;

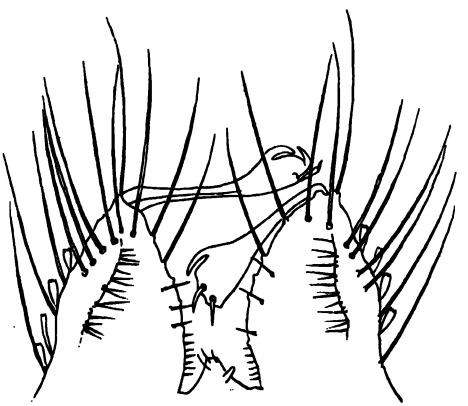


Fig. 81.
Male genitalia of *Reedomyia biannulata.*

scutellum brown, completely covered with flat silvery-white scales ; metanotum brown ; pleurae brown, with some white scales.

Abdomen deep brown, with violet reflections ; basal white bands, but on the seventh are two large basal white spots only, whilst the eighth is all white scaled ; basal lobes of claspers bronzy ; claspers semi-transparent, much swollen apically, resembling a haltere with two thick dark spines, and a hook-like process at the side.

Legs brown, apices of femora and tibiae white, prominently so on the hind legs, where the tibial band is quite broad ; fore and mid ungues unequal, the larger simple, the smaller uniserrate, hind equal and simple.

Wings with short fork-cells, the first sub-marginal longer and narrower than the second posterior, its base very slightly nearer

the apex of the wing, its stem not quite as long as the cell; stem of the second posterior about as long as the cell; posterior cross-vein about one and a third its own length distant from the mid.

Length.—3 mm.

Time of capture.—March.

Habitat.—Sierra Leone (Major F. Smith, R.A.M.C.).

Observations.—Described from several males bred by Major F. Smith, R.A.M.C., from larvae taken in Nichol Brook, Mount Aureol, Sierra Leone. The male genitalia are very peculiar. The white scaled scutellum places it, as far as general appearance goes, near *R. nivoscutella*, but the marked bands on the femora and tibiae and male genitalia at once separate it.

Genus **PECOMYIA.** Theobald.

Journ. Econ. Biol. Vol. I., No. 1, p. 24 (1905).

Head clothed with narrow-curved scales, upright forked scales and flat lateral ones; palpi in female short, long in the male, two apical segments slightly swollen, but acuminate. Thorax with narrow-curved scales; scutellum with narrow-curved and small flat scales mixed together on the mid lobe; narrow, rather long flat scales and a few narrow-curved ones to the lateral lobes; metanotum nude. Wings with mottled scales; the median vein-scales large, bluntly *Taeniorhynchus*-shape, black and grey in patches, the lateral vein-scales linear, but straight and stiff, arising in definite order on each side of most of the veins, like the teeth of a comb; the lateral vein scales of the branches of the second long vein denser and broader than the rest.

The male genitalia with the claspers, with a large inflated basal and sickle-shaped posterior lobe, no lateral segment. Hind ungues of male *unequal* but simple.

This genus resembles in general appearance *Grabhamia*, but can at once be told by the scutellar ornamentation, and the straight stiff lateral vein-scales and the distinct male genitalia.

It is a *Culicine*, and comes between *Reedomyia* and *Grabhamia*.

The presence of unequal hind ungues in the male is unique.

PECOMYIA MACULATA. Theobald (1905).

Journ. Econ. Biol. Vol. I., No. 1, p. 24 (1905).

Head brown, with dull greyish and ochreous scales; proboscis ochreous, mottled with black scales, black at the apex; palpi ochreous, mottled with black scales.

Thorax brown, clothed with dull grey and dull golden-brown scales, paler behind, and with traces of linear ornamentation; scutellum with grey scales.

Abdomen deep brown, with basal white bands. Wings mottled with brown and grey scales; halteres very pale ochreous. Legs ochreous, mottled with deep brown scales, tarsi dark brown, some of the segments with basal pale bands.

♀. Head brown, densely clothed with dull grey narrow-curved scales, with some similar shaped ochreous ones in front,



Fig. 82.
Wing of *Pecomyia maculata*. ♀. Theobald.

dark brown upright forked scales, flat dark brown, then white lateral ones, and with deep brown bristles projecting forward over the eyes. Palpi deep ochreous, with blackish scales, tips of the apical segment grey; proboscis ochreous, with scattered deep brown scales, so dense at the apex that it is quite black; antennae brown, with narrow pale bands at the junction of the segments. Thorax deep brown, clothed with grey and dull golden-brown narrow-curved scales, becoming almost white in front of the scutellum, traces of linear ornamentation seen in some lights, bristles deep brown; scutellum deep brown, the mid lobe with grey, almost white, narrow-curved scales, and a few small flat ones mixed with them; lateral lobes with rather narrow flat white scales, and a few narrow-curved ones at the edges; border-bristles rich brown; metanotum deep brown.

Abdomen deep brown with dull violet reflections and white basal bands, basal segment with grey scales and very pallid bristles; border-bristles pallid.

Legs ochreous, with scattered black, grey and ochreous scales, apex of femora, tibiae and tarsi mostly dark scaled, the first tarsals with white basal bands, also the second and third tarsals of fore and mid legs and all those of the hind pair; fore and mid ungues equal uniserrated; hind equal (? uniserrate).

Wings with mottled brown and grey scales; most of the vein scales broad and truncated, all the median ones are so; the first,

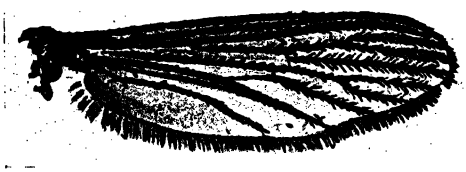


Fig. 83.
Wing of *Pecomyia maculata*. ♀. Theobald.

third, apical portions of fourth and fifth with thin straight lateral scales uniformly disposed; fork-cells short, first sub-marginal longer and narrower than the second posterior, their bases about level, stem of the first sub-marginal nearly two-



Fig. 84.
Another wing of *Pecomyia maculata*. ♀. Theobald.

thirds the length of the cell, stem of the second posterior as long as the cell; posterior cross-vein about its own length distant from the mid. Halteres very pale ochreous.

Length.—4·8 mm.

♂. Similar to the ♀ in general appearance, but the thorax shows some trace of ornamentation.

The palpi are brown with flaxen brown hair-tufts, and with two pale bands and traces of another posteriorly; proboscis mostly dark scaled, but with a median pale band and a few scattered pale scales on the base.

Fore and mid ungues unequal and both uniserrate; the *hind unequal* but simple.

The claspers of the genitalia with a large basal lobe, the clasper itself being long, narrow and curved, there does not

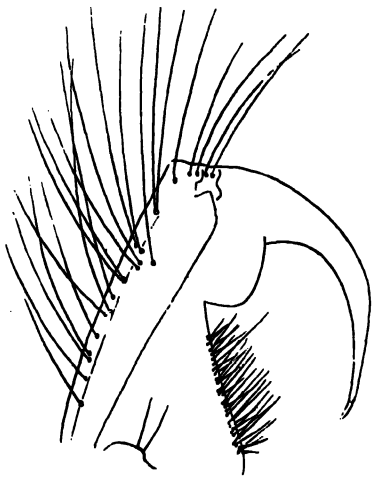


Fig. 85.
Male genitalia of *Pecomyia maculata*. Theobald.

appear to be a terminal lateral segment; hairy basal lobe; harpes short and blunt.

Length.—The same as the female.

Habitat.—India (Drs. James and Christophers).

Observations.—A very obscure species until examined microscopically, when the squamose characters of the scutellum and wings at once show that it is not a *Grabhamia*, which it superficially resembles.

It however bears a very stong resemblance to a *Grabhamia*. The male genitalia are very marked. I am not sure as to the hind ungues of the ♀. I believe they are uniserrate. There is some slight variation in the two ♀'s (*vide* figs. 83 and 84).

PECOMYIA CAECA. Theobald (1901).

Culex caecus. Theobald.

Mono. Culicid. I., p. 413 (1901) (♀ only).

♂. Head brown with narrow-curved creamy scales on the middle and upright brown forked scales, lateral scales flat, dull

white and spreading rather far on to the surface of the head; proboscis deep brown apparently somewhat paler in the middle; palpi brown, the two last segments with basal white bands, the long segment with a broad yellow band and a narrower basal one, the penultimate segment about the same length but thicker



Fig. 86.
Wing of *Pecomyia caeca*. ♀. Theobald.

than the apical one, the apex of the antepenultimate is thickened; there is a rather dense hair-tuft on the penultimate and apex of antepenultimate segments, scantier hairs on the apical segment, hairs brown and golden brown; antennae grey, banded with brown and with flaxen brown plume-hairs, joints somewhat cup shaped, basal segment large and pale brown.

Thorax and abdomen similar to the ♀, but the basal bands of the latter spread out laterally on the last few segments, hairs pale golden-brown.

Fore and mid ungues unequal, uniserrate.

The ♂ claspers are long and end in a large fork.

Length.—5 mm.

Additional habitat.—Ipoh-Parak, Federated Malay States (Dr. Durham); Philippine Islands (Miss Ludlow).

Observations.—This species was originally described from some ♀'s and was placed provisionally in the genus *Culex*. The scutellar scale structure excludes it from that genus and it comes in the genus Pecomyia. The male genitalia are peculiar as far as I can see from a single preparation, the claspers are long and widely forked. The male described here was passed over in a collection sent to the Museum in 1902.

The scutellar flat scales shown in the figure in Vol. I. of this work are too broad.

A female wing is reproduced for reference.

Genus **TRICHORHYNCHUS.** Theobald.

Journ. Bomb. Nat. Hist. Soc. XVI., p. 240 (1905).

Head clothed with small flat scales in front forming a broadish area, similar ones at the sides, narrow-curved ones over most of the median area and many narrow upright forked ones; antennae with long segments, verticillate hairs scanty, the internodes densely hairy; palpi of ♀ rather prominent, apical segment long, slightly swollen. Thorax with narrow-curved scales, also the scutellum. Abdomen and legs normal. Wings with dense scales on the veins of the apical area, those on the first long vein and the branches of the second dense, intermediate in form between *Culex* and *Taeniorhynchus*, those on the upper branch of the fourth short and broader than the rest.

This genus is very marked and comes between the *Stegomyian* group and the true *Culex*. It can at once be told by the cephalic scale structure, and the densely hairy antennae are also very characteristic.

Trichorhynchus fuscus. Theobald (1905).

Journ. Bomb. Nat. Hist. Soc. Vol. XVI., p. 240 (1905).

Head brown with a greyish border around the eyes and at the sides composed of small flat scales. Palpi, proboscis and antennae deep brown; thorax tawny to testaceous brown; pleurae pale ferruginous. Abdomen ferruginous to dusky brown, brighter brown beneath. Legs deep brown, paler basally; unbanded. Wings rather short, fork-cells short.

♀. Head with small flat grey scales forming a broad border around the eyes and with similar flat scales at the sides, in the middle small dull golden narrow-curved scales and fine black upright forked scales behind. Palpi short, brown, testaceous beneath; proboscis brown, the testaceous hue present as in the palpi; clypeus pale yellowish-brown; antennae brown, basal segment pale yellowish-brown, very pilose between the verticels.

Thorax bright ferruginous, clothed with narrow-curved mouse-coloured and dull golden scales and with numerous bristles of a more or less dull hue; scutellum bright testaceous with small narrow-curved scales as on the thorax; seven border-bristles to the mid lobe, metanotum bright chestnut-brown;

pleurae pale ferruginous with frosty sheen in some lights and a few pale bristles.

Abdomen dusky brown, ferruginous brown in some lights covered with dusky brown scales and with rather short pale border-bristles; venter brighter brown.

Legs deep brown, coxae and femora beneath paler; ungues equal and simple.

Wings rather short, the scales dense on the apical area, especially on the branches of the fork-cells and on the first long vein, these scales broader than in *Culex*, approaching *Taeniorhynchus* form; fork-cells rather small, the first sub-marginal longer and very slightly narrower than the second posterior, its stem more than half the length of the cell, its base a little nearer the apex of the wing; stem of the second posterior as long as the cell; scales on the upper branch of the fourth vein rather broader than elsewhere. Posterior cross-vein nearly twice its own length distant from the mid; mid and supernumerary meet at an angle. Halteres pale, with faintly fuscous knob.

Length.—5 mm.

Habitat.—Peradeniya, Ceylon (E. E. Green).

Time of capture.—December (1901).

Observations.—Described from a single ♀ in perfect condition. It is an obscure species, resembling a *Culex*, unless examined under the two-third power when its generic characters are at once seen both in regard to cephalic and wing scale structure.

Genus **PSEUDOTHEOBALDIA.** nov. gen.

Head clothed with large narrow-curved scales and upright forked scales, small flat lateral ones and a few small flat scales elsewhere. Palpi long in the male, the apical segment much swollen with very short hairs, the penultimate with hair-tuft on one side. Thorax with narrow-curved scales except in front of the scutellum, where they become long, rather narrow and flat; scutellum clothed entirely with flat scales. Wings spotted, the membrane tinged—vein scales *Culex*-like.

This genus resembles in general appearance *Theobaldia* but can be separated at once by the flat scutellar scales, the narrower wing scales and the presence of some flat scales on the mesonotum before the scutellum.

PSEUDOTHEOBALDIA NIVEITAENIATA. n. sp.

Head deep brown with golden scales; proboscis unbanded; palpi of the ♂ clubbed, deep brown with three pale bands. Thorax deep brown, ornamented with golden scales showing somewhat linear arrangement; scutellum with silvery scales. Abdomen black with basal silvery-white bands. Legs deep brown, unbanded, with yellow knee spot and traces of a pale band on the fore femora. Wings with traces of spots of scales at the base of the fork-cells and tinged at the end of the second vein and cross-veins.

♂. Head deep brown, with narrow-curved creamy scales in the middle, dark brown ones at the sides, some paler ones around the eyes, golden bristles in the middle in front, dark at the sides; proboscis rather long, deep blackish-brown; palpi as long as the proboscis, the apical segment broadly clavate and shorter than the penultimate, the latter slightly swollen apically with longish brown hairs on one side except at the apex, where they are pale golden, and also at the base, there is a narrow pale golden band at the base of the two apical segments and one

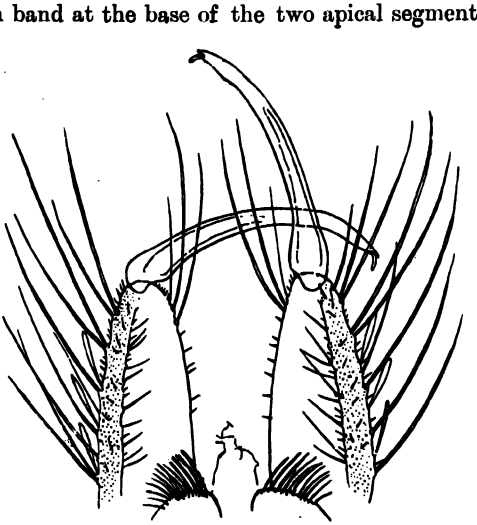


Fig. 87.
Male genitalia of *Pseudotheobaldia niveitaeniata.*

on the long antepenultimate segment; antennae banded deep brown and grey with deep brown plume-hairs, basal segment paler with large narrow-curved pale golden scales.

Thorax deep brown, with narrow-curved bright golden scales, placed so as to present slight linear arrangement, rather broad paler ones over the roots of the wings; chaetae partly golden, partly brown; scutellum deep brown, clothed with silvery-white flat scales, six large golden brown border-bristles to the mid lobe, slightly darker ones on the lateral lobes, some long flat broad ones of paler hue before the scutellum; metanotum deep brown; pleurae deep brown, with silvery-white flat scales and a small patch of flat creamy scales.

Abdomen deep blackish-brown, each segment with a basal silvery white band; venter silvery-white; hairs of the body flaxen.

Legs deep blackish-brown, with a yellow knee spot and a spot at the apex of the tibiae and another towards the apex of the fore femora; fore and mid ungues unequal, the larger with two teeth, the smaller with one, hind ungues equal and simple.

Wings with brown scales which are denser at the base of the fork-cells and at the cross-veins and the base of the second long



Fig. 88.
Wing of *Pseudotheobaldia niveitaeniata*. ♂. n. sp.

vein, where the wing membrane is faintly stained brown; first sub-marginal cell a little longer and slightly narrower than the second posterior cell, its base nearer the apex of the wing, its stem as long as the cell; stem of the second posterior cell as long as the cell; supernumerary and mid cross-veins in one line, the posterior just in front of the mid and, like it, longer than the supernumerary; scales of *Culex* form.

Genitalia with long narrow basal lobes and long thin slightly curved simple claspers, ending on a short small segment.

Length.—6 mm.

Time of capture.—February to March.

Habitat.—Dehra Dhoon, India (Capt. Thomson).

Observations.—Described from two perfect males. At first

sight it appears like Schiner's *Culex* (*Theobaldia*) *glaphyroptera*, which it resembles in the spotted wings and general colouration, but can at once be told by the silvery-white flat scaled scutellum, by the palpi having the apical segment only swollen and by the different male genitalia which have been figured by Ficalbi (*vide* Vol. I., p. 347, Mono. Culicid., 1901); the digitate process at the apex of the basal lobe is absent and the clasper nearly straight, not curved at the end.

Genus **MAILLOTIA.** nov. gen.

Head clothed with rather broad, large curved-scaled, upright forked scales and pyriform and flat lateral scales.

Thorax clothed with large curved scales similar to those of the head; scutellum with short, rather broad, spindle-shaped scales.

Wing scales dense; lateral ones thin.

The genus is near *Culex*, but is quite distinct, its peculiar characters were noticed by Dr. Edmond Sergent, who suggested the name under which it is described.

Maillotia pilifera. n. sp.

Head with creamy scales and black upright forked ones. Proboscis long, unbanded. Thorax black, with golden-brown to almost golden scales and showing dark lines; scutellum with paler scales.

Abdomen black with prominent apical white bands, the band on the second segment sending a triangular process into the middle of the segment. Legs deep brown, unbanded.

♀. Head black, clothed scantily with rather broad curved creamy scales, small flat and pyriform dull creamy ones at the sides, smaller pale creamy ones closely packed together around the eyes, black upright forked scales in the middle, brown at the sides.

Proboscis black, long, swelling towards the apex. Palpi short, dark brown, ochreous scales at the apex. Antennae deep brown, basal segments with ochreous scales.

Thorax black, with large curved creamy scales, paler in the middle and in front than at the sides, where they have a brown tinge, in certain lights appearing bright brown under the hand

lens, there are two median parallel dark bare lines; scutellum brown, with broader, more spindle-shaped and more appressed creamy scales; posterior border-bristles dark brown; metanotum deep brown; pleurae brown, with flat creamy white scales.

Abdomen deep blackish-brown, the segments with apical creamy white bands; in the second segment the white band sends a median triangular process towards the base; first segment with median flat white scales only; posterior border-bristles pale, short in the middle of the segments, longer at the sides; venter pale scaled in the middle.

Legs deep brown, unbanded; femora pale at the base and ventrally.

Wings with the first sub-marginal cell longer and narrower than the second posterior cell, its base a little nearer the base of the wing, its stem about half the length of the cell; stem of the second posterior cell about two-thirds the length of the cell; posterior cross-vein rather more than its own length distant from the mid; halteres ochraceous.

Length.—3·5 mm.

Habitat.—Algeria (Dr. Edmond Sergent).

Observations.—A very marked species, easily told by the very prominent V-shaped pale mark on the second abdominal segment arising from the apical pale border and by the broad curved scales on the head and thorax. It has to be placed in a new genus, as no *Culicid* I have seen comes near it in scale structure. The new generic position was noticed by Dr. Edmond Sergent, who sent me the specimen, and the name of genus and species proposed by him is that under which it is described.

Genus **THEOBALDIA.** Neveu-Lemaire (1902).

Theobaldinella. Blanchard (1905).

Comp. Rend. d. Ss. d. l. Soc. Biol., 29 Nov. (1902); Mono. Culicid. III., p. 148 (1903); Gen. Ins. Fam. Culicid., p. 23 (1905), Theobald; Les Moust., p. 390 (1905), Blanchard (*Theobaldinella*).

Blanchard renamed this genus *Theobaldinella* because the name Theobald*ius* had been previously used by Neville, Theobald*ia* had not, so that Neveu-Lemaire's name is retained.

THEOBALDIA SPATHIPALPIS. Rondani (1872).

Culex spathipalpis Rondani (1872).

Bull. d. Soc. Ent. Ital. IV., 31, 12 (1872), Rondani; Dipt. Ital. Prodro. 1 (1886); Mono. Culicid. I., p. 339 (1901), and III., p. 154 (1903); First Rept. Gord. Coll. Well. Labs., p. 73 (1904).

Additional localities.—This species has been found again in the Sudan, and Mr. Willcocks sends me many from Egypt, also Santa Cruz, Teneriffe, in November and December; St. Michaels, Azores, in September, Madeira in October (Dr. Grabham); and Cyprus (Miss Bate).

Notes.—*Larvae* and *pupae* have been found in Khartoum, and are described here, as they have not previously been seen.

The specimens were badly mounted, so that only a few characters can be given.

The larva when mature is 8 mm. long. The head is bright chestnut-brown with black eyes and band across the nape, not so wide as the thorax. Thorax and abdomen greenish-brown; siphon brown. The antennae are simple and tubular and end in a short spine or two; on the side towards the apical half is a three-rayed bristle; in a line between the antennae are two median single bristles and one on each side composed of three rays; projecting from the front of the head are two flat curved spines ending in three digit-like processes; the labial plate is acutely triangular, the bases are drawn down on each side, the lateral serrations numerous and small; just in front of the eyes is a four-rayed bristle.

The thorax bears long dense lateral plumose tufts, with smaller short simple tufts in four rows dorsally.

The first three abdominal segments bear a tuft of several plumose chaetae on each side, the fourth three setae, and the next three two setae. The siphon is short and thick, and bears a comb of seven long thick thorn-like spines; the anal papillae are bluntly acuminate.

The *pupa* is 5 mm. long, the two thoracic air siphons are large and much expanded, one free border being raised into a prominence, the segments deeply indented ventrally; the two anal plates are very broad and the free end finely ciliated along the border, the axial rod is asymmetrical; there are simple bristles on the head, compound tufts on the thorax, that on the posterior dorsal surface of the last segment most prominent.

THEOBALDIA ANNULATA. Schrank (1776).

Culex annulatus. Schrank (1776).

Theobaldinella annulata. Schrank-Blanchard (1776).

Culex variegatus. Schrank (1781).

Culex affinis. Stephens (1825).

Mono. Culicid. I., p. 331 (1901), and III., p. 148 (1903), Theobald; Mantissa Ins. II., 363, 2 (1787), Fabricius; Syst. Nat. V. 2887, 8 (1792), Gmel.; Recueil Soc. Sc. Agric. Lille, 216, 1 (1826), Macq.; Mém. Soc. d'Hist Nat. Paris, III., 405, 10 (1827), Robineau Desvoidy; Abbild. europ. zweif. Ins. I., tab. 1, fig. 1 (1830), Meigen; Naturhist. Tidsskr. II., 554, 5 (1839), Staeg; Bull. Soc. Ent. Ital. IV., 31, 11 (1872), Rondani; K. Danske Selsk. Skrift. III., 376, tab. 1, fig. 1–16 (1886), Meinert; Hndbk. Gnats, 203, 3 (1900), Giles; Mono. Culicid. I., p. 331, 3 (1901), and III., p. 148 (1903), Theobald; Állattan, Közl. III., 60 (1904), Kertész; Ann. Mus. Nat. Hung. III., p. 82 (1905), Theobald; Les Moust., p. 393 (1905), Blanchard; Sec. Rept. Eco. Zoolo. (Brit. Mus.), p. 10 (1904), Theobald; Rept. Eco. Zoolo. for 1905, p. 111 (1905), Theobald; Class. Mosq. N. and M. America, Tech. Se. 11, U.S. Dept. Agri., p. 22 (1906), Coquillett; Zool. Journ. Lond. IV. (1825) = *affinis*, Stephens; Enum. Ins. Austr. 482, 983 (1781) (= *variegatus*), Schrank.

Additional localities.—California (Miss Ludlow and Prof. Kellogg); Budapest and other localities in Hungary (Kertész); India; in England in the following places, Budleigh Salterton, S. Devon; Canterbury; Bath; Lynmouth; Hastings; Worcester (F. V. Theobald), Weston-super-Mare (H. Jackson).

Notes on Life-history and habits.

Recent observations have shown that this large mosquito is a very vicious biter in this country. One correspondent, Mr. W. Hatchett Jackson, D.Sc., stated that "the consequence of its bite may be so severe indeed that the patient has to go to bed." This gentleman informed me that "it usually occurs in the flat country round Weston-super-Mare in large numbers in September and October, but only invades Weston itself to any appreciable extent when the wind blows from the plains, that is to say, between N.E. and S. It has been relatively rare round Weston and on the Glastonbury Plain the last few years owing to the ponds and wet dividing ditches, known in Somerset as rhines, being dry or almost dry in summer. In the autumn of the past year [1905] it has been a veritable plague. Hence few persons in Weston and its neighbourhood have escaped the attack of this gnat. The consequence of its puncture may take one of three distinct lines:

(1) It is followed by a simple hard swelling which rises and disappears slowly. Traces of it may exist for months.

(2) A swelling like above may arise accompanied by a large reddened and puffy area of inflammation, and a clear vesicle containing a yellowish lymph develops in the centre of the hard swelling. Cases have occurred, especially in women, where there have been four or five simultaneous punctures, and the patient has suffered so much malaise as to retire to bed with fever ranging up to 101° F.

(3) The hard swelling is slight or absent, but there is a great and extensive oedema.

The same observer noticed that on a warm sunny day in November the ♀'s settled on the stems of periwinkle and wall-flowers and inserting their proboscides, apparently engaged in sucking. It is also met with in the woods of Worlebury Hill, behind Weston, on the north, and is sometimes spoken of as the "Wood Gnat." Their blood-loving habit has also been recorded from Canterbury,* and I have taken females gorged with blood in March at Budleigh Salterton, S. Devon, where I was told it is often troublesome. I have also found that it bites man at Wye, but not to any serious extent.

Time of hatching.—Observations made in 1903 showed that the imagines hatched out between 8 and 11 o'clock in the morning. The first few days ♀'s alone appeared, then for two mornings nothing but ♂'s, then ♀'s again. The ♂'s nearly all hatched out in the centre of the barrel, the ♀'s against the sides. This took place between August 17th and 27th. None could be found until the late autumn in the house or privies; they apparently fly to the woods at first.

The larva.—The larvae may be found in rain-water barrels, pools, ditches, or jam pots. When mature they reach $\frac{3}{4}$ of an inch long; pale greyish-brown in colour, the head smaller than the thorax, and a short thick siphon.

The *pupa* has the sides of the thorax when in the water silvery in hue, due to air which collects at the sides; siphons truncated and rather curved; anal flaps prominent and a distinct dendriform tuft on the first abdominal segment.

The *eggs* are laid in large boat-shaped masses.

* Report on Economic Zoology for year ending April 1st, 1905, p. 111. F. V. Theobald.

THEOBALDIA INCIDENS. Thomson (1868).

Theobaldinella incidens. Thomson (1868).

Culex incidens. Thomson (1868).

Culex particeps. Adams (1903).

Eugen. Resa. Dipt., p. 443 (1868); Mono. Culicid. III., p. 151 (1903) (*Theobaldia incidens*), Theobald; Les Moustiques, p. 393 (1905), Blanchard (*Theobaldinella*); Class. Mosq. N. and M. America, Tech. Se. 11, U.S. Dept. Agri., p. 22 (1906), Coquillett.

Note.—A large amount of new material has been received from Miss Ludlow and others in America.

A large number have been received from Pecos Canon, New Mexico. These showed more evident leg banding than in others I have seen, especially on the hind legs of one or two specimens. The position of the posterior cross-vein is seen to vary considerably.

Additional localities.—Fort Apache, Arizona; Boise Barracks, Idaho; Fort Washakie, Wyoming; Fort Wingate, New Mexico; Washington (Miss Ludlow); British Columbia (Dr. Dyar).

Synonomy.—I cannot see any reason for separating Adams' *Culex particeps* from this species. The only difference in the description is that the petiole of the first fork-cell in the female is one-third the length of the cell; this is unusually short, but its relative length varies so much it is of no account; the other feature I have not noticed is the presence of a few yellow scales on the proboscis and some white ones at the base of the wings.

Coquillett also places *particeps* as a synonym of *incidens*.

Adams' description is here appended.

CULEX PARTICEPS. Adams (1903).

Kansas Uni. Sci. II., 2, p. 26 (1903).

"♂. Head brown covered with yellowish scales, among which are some pure white ones, few hairs along eyes black; proboscis dark brown, bearing a few yellowish scales; palpi brown, base of each segment white; antennae brown, lighter at base; thorax brown, bearing yellow and white scales, the latter most prominent on posterior part, pile black; halteres pale with brown knobs; abdomen brown, scales at base of segments white, on remaining part of segments the scales are brown, a few scattering ones yellow, venter almost wholly covered with white scales; fore coxae brown, others rather pale; femora black with the posterior side on basal half, and a ring near apex white scaled; tibiae black, with a few white scales; tarsi black, with bases white; front and mid tarsal claws toothed,

hind ones small and simple; veins of wings light brown, bearing narrow brown scales, those on the anterior part of wing mixed with white ones; a spot at the origin of the second vein, the small cross-vein, and a spot beginning at the base of the first sub-marginal cell and crossing the second sub-marginal and first posterior cells, clouded with brown, the cross-veins at end of first and second basal cells approximated; petiole of first sub-marginal cell one-half length of cell.

♀. Agrees with ♂, except has more long black scales on head, petiole of first sub-marginal cell one-third the length of that cell; all tarsal claws simple.

Length.—8 mm.

One male and six females; Arizona.—Prof. F. H. Snow."

Genus **PARDOMYIA.** nov. gen.

Head clothed as in *Culex*, with very long upright forked scales; palpi of ♀ fairly long, about one-fourth the length of the proboscis; long in the male. Thorax and scutellum with narrow curved scales. Wings with scanty scales, thickish rather closely appressed lateral vein scales, and the wing membrane stained in places deep brown. Venation typical, but the second posterior cell is very large. Legs very long, especially the hind pair. Large species with brilliant golden and brown markings and spottings. The stained wing membrane and its large size make it a very marked genus.

Pardomyia aurantia. n. sp.

Head bright golden yellow; palpi the same colour in ♀ except for black apex. Thorax rich brown with a narrow golden yellow border in front. Abdomen deep brown basally with deep violet reflections, golden apically. Femora and tibiae spotted with golden yellow and deep purplish brown; hind legs with a yellow basal band to the first, second, and third tarsals, last hind tarsals pure white. Wings tinged with yellow and with scantily yellow scaled veins, a dark spot at the cross-veins and at the marginal cross-vein.

♀. Head pale brown, densely clothed with bright golden yellow narrow-curved scales, particularly dense around the borders of the eyes, numerous rich ochraceous to golden yellow long upright forked scales, becoming a little darker at the sides, flat yellow lateral scales with a small brown area in the middle;

chaetae golden or pale brown according to the light; the whole head presents a general golden yellow appearance.

Palpi longish, about one-fourth of the proboscis, yellow with golden yellow scales except at the apex, where there are some black ones; proboscis deep yellow, dark brown at the extreme apex, numerous short black hairs; antennae brown, basal segment and second segment yellowish with some pale yellow scales.

Thorax bright brown, with a prominent band of brilliant golden yellow narrow-curved scales running across it behind the head, the remainder clothed with deep black narrow-curved scales of almost sooty appearance; chaetae numerous, golden in front, black over the roots of the wings, some with golden sheen apically; scutellum deep brown with golden narrow-curved scales and brown border-bristles; metanotum mottled with deep and bright brown; pleurae deep brown with some spots of golden scales.

Abdomen golden brown, the two basal segments clothed with almost entirely deep violet black scales, the third with some median spots of bright golden yellow scales, the remainder having gradually more golden yellow scales mixed with the violet black until the segments become brilliant metallic golden yellow; venter mostly golden yellow, some dark scales along the apical border of the segments; border-bristles brown on the basal segments, golden on the apical.

Legs long, hind pair very long, femora and tibiae spotted with rich golden and violet-black, the fore and mid first tarsals and the others unadorned, brown in some lights, pale golden or brassy in others; in the hind legs the base of the first tarsal, second tarsal, and to some extent the third tarsal, with a narrow yellow band, most pronounced on the first tarsal, the last hind tarsal pure white; ungues all equal and uniserrate.

Wings large, tinged with yellow and with yellow veins, scaled with yellow and brown scales, the former predominating, except at the base of the wing, where the scales are deep violet-black; scales on the second and third veins mostly yellow, the scales all very small, some veins apparently with only very narrow median vein scales, lateral ones present, however, on the branches of the fork-cells and apex of third; at the cross-veins, base of second vein (marginal cross-vein), and at the humeral vein a brown spot on the membrane, the first large and very prominent, the other two small; first sub-marginal cell very slightly longer and narrower than the second posterior cell, its

base nearer the apex of the wing, its stem as long as the cell; stem of the second posterior nearly as long as the cell; supernumerary cross-vein a little in front of the mid, which is shorter than either the posterior or supernumerary, the posterior also a little in front of the mid, much longer than either of the others; halteres with ochreous stem, and fuscous knob with a line of paler scales at the apex.

Length.—6 to 7 mm.; length of hind legs 16 mm.

Habitat.—Kuching, Sarawak (Dr. Barker, P.M.O.).

Time of capture.—November.

Observations.—This large handsome mosquito cannot be confused with any other species. It varies to some extent in regard to the amount of golden scales on the abdomen and the spotting on the legs.

Genus **MEGACULEX.** nov. gen.

Head clothed with narrow-curved scales in the middle, the flat lateral ones extending far on to the occiput, and numerous upright forked scales; palpi of ♀ rather long, more than one-fourth the length of the proboscis; antennae pilose in ♀ about as long as the proboscis; plumose in the ♂, scaly on the basal lobe; male palpi long, with one short, rather swollen apical segment; apparently only two-jointed. Thorax and scutellum with narrow-curved scales. Wings with short fork-cells; the scales on the apical area of the veins large, pear-shaped, the majority of the veins with a single median row of small spatulate vein scales only; stems of both fork-cells very much longer than the cells.

This genus is markedly distinct from any other. The short fork-cells, wing scales, head scale ornamentation, longish female palpi, long antennae, and peculiar male palpi at once separate it from *Culex*.

A single species so far only known, which was described from a ♂, and placed provisionally in *Culex* as *C. albitarsis*.

MEGACULEX ALBITARSIS. Theobald (1901).

Culex albitarsis. Theobald (1901).

Mono. Culicid. II., p. 25 (1901), and III., p. 186 (1903), Theobald (not the ♀ *albitarsis* of Neveu-Lemaire, Archives di Parasitologie, VI., p. 10, 1902).

The ♂ only so far described.

♀. Head brown, clothed with narrow-curved pale creamy scales in the middle, bordered by flat dusky scales which extend backwards on each side of the head, dull ochreous in front, numerous black upright forked scales; palpi rather more than one-fourth the length of the proboscis, brown basally, then ochreous, then brown again, a pale ochreous patch towards the base; proboscis deep ochraceous, with a few scattered brown scales and a black apex; antennae very long, as long as the proboscis, deep brown, basal segment and part of the second bright ochreous with small dusky flat scales.

Thorax deep brown with narrow-curved bronzy-brown scales, paler at the sides and over the roots of the wings, and some mixed pale ones before the scutellum; numerous black chaetae projecting forwards over the head and golden brown ones over the roots of the wings; scutellum brown with small narrow-curved dusky scales on the mid lobe, creamy ones on the lateral lobes, twelve posterior border-bristles to the mid lobe; metanotum brown; pleurae pale brown with some areas of small flat pale scales, a tuft of long pale hairs under the base of the wing.

Abdomen deep brown with basal white bands and median lateral white spots; venter golden. The basal segment is completely clothed with deep violet-brown scales and long pale golden chaetae.

Legs deep brown, femora pale ochreous at base and beneath; the last two hind tarsals and apical half of the penultimate snowy white; ungues equal and simple on all the legs; a trace of narrow pale bands at base of first and second tarsals on the mid and hind legs, and even traces at the base of the others on the fore legs.

Wings with the fork-cells very small, the first sub-marginal a little longer and narrower than the second posterior, its stem about one and two-thirds the length of the cell, its base nearer the apex of the wing; stem of the second posterior cell not quite twice as long as the cell; supernumerary cross-vein shorter than and a little in front of the mid, posterior cross-vein very long,

much longer than the mid and a little nearer the base of the wing ; marginal transverse long ; the sub-costal transverse short, not far from the marginal. Lateral vein scales on the branches of the second and fourth veins pyriform, also near apex of third

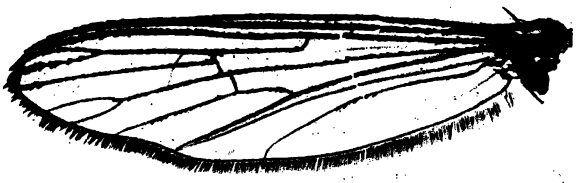


Fig. 89.
Wing of *Megaculex albitarsis*. ♀. Theobald.

long vein, and a few elsewhere ; median vein scales small, spatulate, composed of a single row. On the sub-costal and first long vein the scales are longer and denser, and there are pyriform ones on the apical area of the latter.

Length.—6·5 to 7 mm.

Habitat.—The ♂ was originally described from Bonny, West Africa, from a perfect specimen taken by Dr. Annett. The ♀ described here was given me by Mr. Newstead from a series taken by Drs. Dutton and Todd in the Congo Free State.

Observations.—Originally placed in *Culex*, it is now made the type of a new genus.

This species was recorded by Neveu-Lemaire, who described the ♀, from French Guiana. It is not the ♀ *albitarsis* because it has the antennae shorter than the proboscis, whilst in *albitarsis* they are as long as the proboscis, and the ungues in *albitarsis* are all simple.

Genus **GRABHAMIA.** Theobald (1903).

Feltidia. Dyar (1905).

Mono. Culicid. III., p. 243 (1903), Theobald ; Proc. Ent. Soc. Wash. Vol. VII., No. 1, p. 47 (1905), Dyar ; Gen. Insect. Fam. Culicid., p. 23 (1905), Theobald.

Dr. Dyar has placed my *Grabhamia jamaicensis* as the type of the genus *Feltidia*. The genus *Grabhamia* was founded on the species *jamaicensis*, so *Feltidia* cannot stand.

At present twenty-one species are known. All have the wings mottled. The species all seem to lay their eggs separately, and the larvae have short siphons.

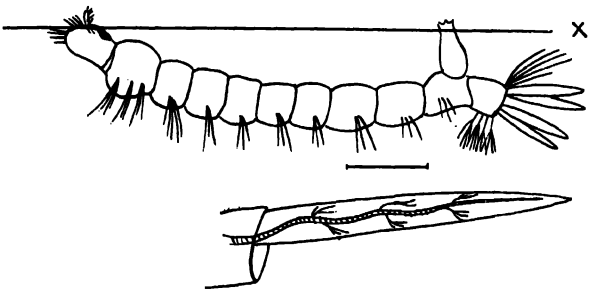


Fig. 90.

Larva of *Grabhamia jamaicensis*. Theobald. (After Glenn-Herrick.)
(One anal gill shown below.)

Genus GRABHAMIA.

Species.	Leg bands.	♀ ungues.	♂ ungues.
G. pulcritarsis. Rond....	Legs with apical and basal banding.	1·1–1·1–1·1?	2·1–2·1–0.0
G. pulcripalpis. Rond. .		1·1–1·1–0·0	1·1–1·1–0·0
G. penicillaris. Rond. .		1·1–1·1–1·1	2·1–2·1–1·1
G. dorsalis. Meig.		1·1–1·1–1·1	1·1–1·1–1·1
G. subtilis. Serg.....		1·1–1·1–1·1	2·1–1·1–1 1
G. willcocksii. n. sp. ...		1·1–1·1–1·1	1·1–1 1–0·0
G. sollicitans. Walk. ...		1·1–1·1–1 1	2·1–2·1–1·1
G. longisquamosa. Theo.		1·1–1·1– ?	n. k.
G. ochracea. Theo.		0·0–0·0–0 0	n. k.
G. taeniarostris. n. sp. .		0·0–0·0–0·0	n. k.
G. mariae. Serg.		1·1–1·1–1·0?	2·1–1·1–0·0
G. currici. Coq.....		1·1–1·1–1·1	
G. jamaicensis. Theo. .	Legs with basal bands, unbanded.	0·0–0·0–0·0	2·1–2·1–0·0
G. pygmaea. Theo.		0·0–0·0–0·0	2·1–2·1–0·0
G. durbanensis. Theo. .		1·1–1·1–0·0	n. k.
G. flavifrons. Sk.....		1·1–1·1–0 0	n. k.
G. vittata. Theo..		1·1–1·1–1·1	1·1–1·1–1·1
G. discolor. Coq.		0·0–0·0–0·0	2·1–2·1–0·0
G. spenceri. Theo.	Legs unbanded.	1·1–1·1–1·1	n. k.
G. maculosa. Theo.....		1·1–1·1–1·1	n. k.
G. ambigua. Theo.		n. k.	1·1–1·1–0·0
G. nanus. Coq. = *G. pygmaea.* Theobald.			

n. k. = not known.

GRABHAMIA JAMAICENSIS. Theobald (1901).

Culex jamaicensis. Theobald (1901).

Culex confinis. Coquillett (non Arribalzaga).

Mono Culicid. I., p. 345 (1901), and III., p. 244 (1903), Theobald; Mosq. Jamaica, p. 29 (1905), Theobald and Grabham; Ento. News, p. 81 (1904), Glenn-Herrick.

Additional localities.—Fort Caswell, S. Carolina; Florida; Fort St. Philip, Louisiana; Washington Barracks, D.C.; Fort

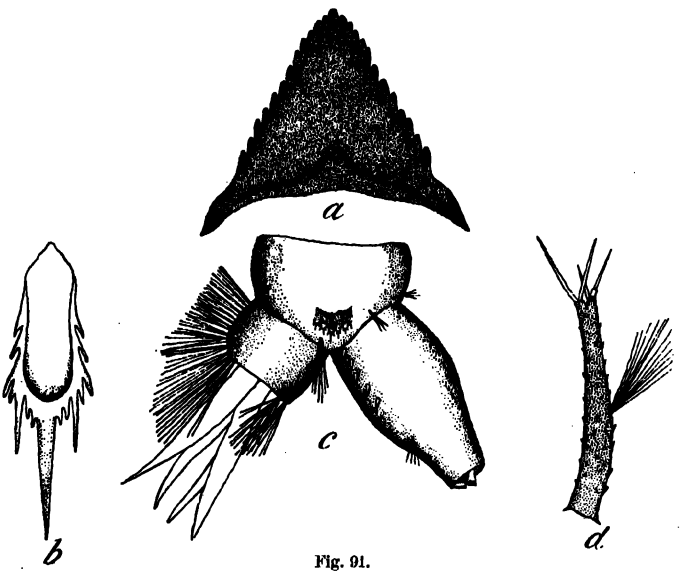


Fig. 91.

Larval characters of *Grabhamia jamaicensis.* Theobald.

a, Labial plate; b, scale of comb of 8th segment; c, siphon, etc.; d, antenna (after Smith). Compare with Felt's figures.

Du Pont, Delaware; Fort Morgan, Alabama; Virginia; Fort Washington, Maryland (Miss Ludlow); New Jersey (J. B. Smith); Mississippi (Glenn-Herrick).

Life-history and habits.—The life-history has been worked out by Professor Glenn-Herrick (Ento. News, p. 81, 1904), and again by Professor J. B. Smith (Mosq. N. Jersey, p. 191, 1905).

The larvae were first noticed by Glenn-Herrick in an open sewage drain at the College Campus, Mississippi, in 1901, and also scores in a roadside pool near Starkville. At first sight

they might be mistaken for *Anopheles*, owing to their horizontal position in the water. They lie just below the surface film.

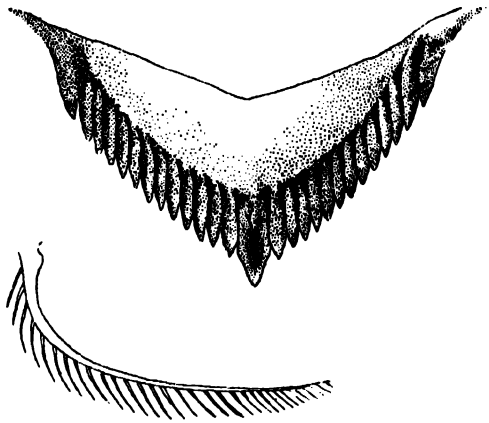
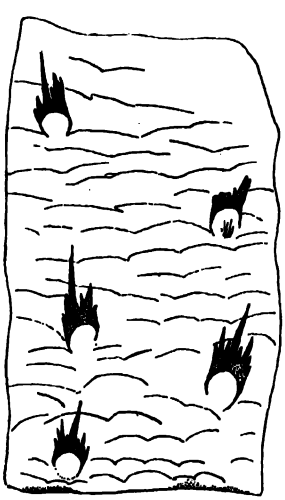
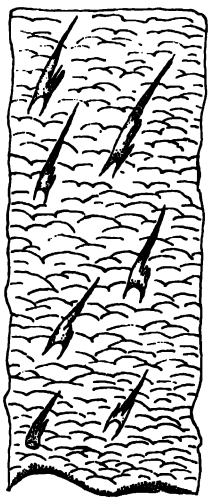


Fig. 92.
Grabhamia jamaicensis.
Labial plate with hair on same (after Felt).



Pecten of *G. jamaicensis*. Theobald. (After Felt.)



Pecten of another larva of *G. jamaicensis* (after Felt).

Fig. 93.

Rain-water pools of transient nature seem their favourite abode, those found in the sewage ditch being exceptional.

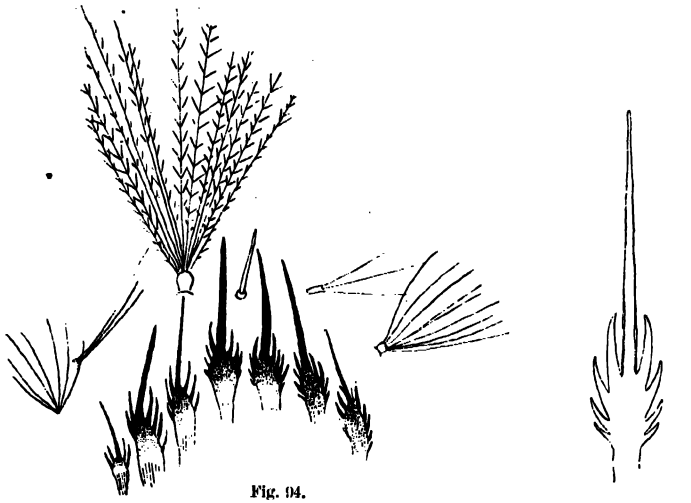


Fig. 94.
Comb of *Grabhamia jamaicensis*. Theobald. (After Felt.)

Mid spine of comb.

When the larva rises to the surface it assumes at first the position of a *Culex*, but after a moment, if left undisturbed, the body with a slight jerk floats quickly to an approximately horizontal position, with the head on a level with the surface of the water. It differs from *Anopheles* in this respect, however, that like a piece of slack rope, that it is curved down between the head and respiratory tube. The tube projects at least a third of its length out of the water. They are constantly swimming about in a backward direction. The anal filaments are much longer and more slender than in *Culex*. Professor Glenn-Herrick says the respiratory tube is much longer than in *Culex fatigans*. The figure does not show this, and a character of this genus is the short larval siphon. The antennae have a small lateral tuft towards the apex. The comb on the eighth segment is composed of conspicuously toothed spines joined on a weak basal segment. The pupae are large and are figured with long siphons, with two tiers at the truncated end. This stage lasts, according to Professor Herrick, forty-eight hours. The eggs are laid singly, as

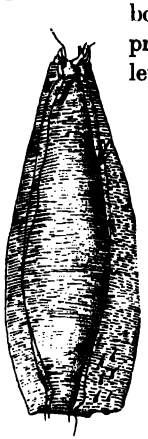


Fig. 95.
Grabhamia jamaicensis.
Larval siphon.

observed by Dr. Grabham, and are possibly, as in *G. sollicitans*, laid on dry mud or moist soil, and await the coming of rain. The eggs of *G. dorsalis* can withstand desiccation some months, and hatch out at once when placed in water. This habit of laying eggs on dry or drying mud in places likely to catch water and so form pools is apparently common to the members of this very distinct genus.

Professor Smith, whilst agreeing in the main with this, yet states (p. 193) that in New Jersey the habit of assuming the horizontal position seems much less developed. The younger larvae, he finds, do assume and for a time maintain this attitude; but when nearly mature they take the horizontal position when rising to the surface, maintain it for a few moments only, and then drop back to the normal Culicine position.

Coquillett (Class. Mosq. N. and M. America, p. 22, 1906) says that all his references under *confinis* refer to this species.

GRABHAMIA PYGMAEA. Theobald (1903).

Culex nanus. Coquillett (1903).

Taeniorhynchus antiguae. Giles (1904).

Mono. Culicid. III., p. 245 (1903); Canad. Entomo., p. 256, Sept. (1903) (= *nanus*); Mosq. Jamai., p. 31 (1905); Journ. Trop. Med., p. 384 (1904) (= *antiguae*), Giles.

Geographical distribution.—Antigua, Jamaica, Florida.

Life-history and habits.—The following notes and figure were sent me by Dr. Grabham: "Two gorged specimens, captured on a horse and introduced into breeding jars. A few eggs were laid about thirty-six hours afterwards. The insects were then killed and pinned. The eggs were deposited like those of the type, separately on the surface of the water. They were comparatively large, about $\frac{3}{4}$ mm. long, and somewhat narrow and covered with hollow papillae curved at their apices towards the narrow end of the ovum. The air-chambers are quite different to those in *Stegomyia fasciata* ova. The larvae hatched out two days afterwards and were fully grown in eight days. The appearance of the last three segments of the adult larva is as shown in the figure. Anal papillae, lanceolate, acuminate, as long as the longest posterior hairs. A short chitinous collar around the posterior half of the ninth segment strengthened on the under surface by transverse bars. A pair of tufts of hairs spring

from the upper surface and eight to nine pairs from the ventral surface. Respiratory siphon a little more than twice as long as broad. At each of the postero-lateral margins a row of four short, two- to four-branched bristles. A pair of compound plumose hairs at the upper border of the eighth segment, each hair with six to seven trichae. A row of compound bristles at the postero-lateral margin of the eighth segment, composed of six to seven claw-shaped bristles, each with five to six stout highly chitinised curved denticles. The long hairs on the thorax, especially those on the posterior groups, are plumose. Lower lip of Meinert with twelve to sixteen teeth on each side. The adult larva seen in breeding jar has two dark olive-green spots on the upper surface of the sixth segment. Antennae truncate, lateral

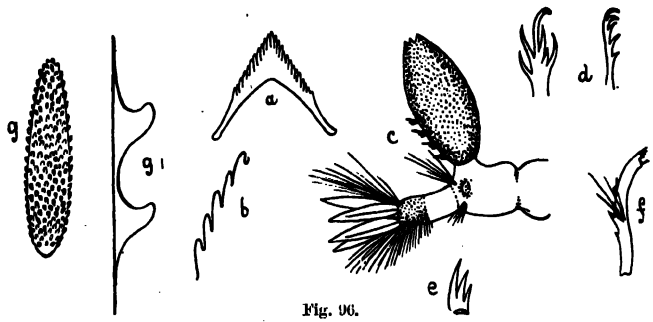


Fig. 96.

Larval characters of *Grabhamia pygmaea*. Theobald.

a, Labial plate; b, enlarged teeth of same; c, siphon and anal segments; d, scales of comb of 8th segment; e, scale of pecten; f, antenna; g, egg; g_1, enlarged papillae of egg-shell.

tuft of a few hairs (sometimes only one). A few short terminal hairs. The pupal stage lasted about thirty-two hours."

Observations.—Giles has recently (1904) described this very marked *Grabhamia* as a new *Taeniorhynchus—T. antiguae*—in the Journal of Tropical Medicine. The type is in the British Museum, and has been placed in its true position.

I have not seen any specimens of Coquillett's *Culex nanus*. He states that it is "near *jamaicensis*, but much smaller, etc." From the short description it certainly reads as *Grabhamia pygmaea*. This species was apparently not known to Coquillett when he drew up the account of his *Culex nanus* in the September number of the Canadian Entomologist.* Coquillett's description

* Coquillett now places his *nanus* as a synonym of *pygmaea* (Class. Mosq. N. and M. America, p. 22, 1906).

of *Culex nanus* is here appended in case on examination of the type it should prove to be distinct:—

"♀. Near *jamaicensis*, but much smaller, the light-coloured scales on the tibiae not collected into spots, mesonotum without round spots of yellowish scales, etc. Black, the base of the antennae except the first segment, a band at middle of proboscis, the halteres and bases of femora yellow; scales and hairs of palpi black, appressed scales of occiput golden yellow, the upright ones black, scales of mesonotum golden yellow, those of the abdomen black, and with a broad cross-band of whitish ones on the hind margin of each segment, the last two segments nearly wholly whitish scaled; the scales of venter white, those of femora and tibiae mixed black and whitish, the latter forming a ring near three-fourths the length of each femur, scales of tarsi black, those at narrow bases of the joints whitish, tarsal claws simple; wings hyaline, the scales mixed black and white, the black ones not collected into spots, lateral scales of the anterior veins narrowly lanceolate, those of the anterior veins almost linear; length, 3 mm. Four specimens collected at Key West, Florida, in August, 1901, by Mr. August Buck, and six by Mr. E. A. Schwarz, April 1 to 3, 1903. Type No. 6893. U.S. National Museum."

GRABHAMIA SOLLICITANS. Walker (1856).

Culex sollicitans. Walker (1856).

Culex taeniorhynchus. Howard, 1900 (non Wiedemann).

Culex solicitans. Giles (1900).

Insect. Saund., p. 427 (1856), Walker; Cir. No. 40, 2nd Se., U.S.A. Dept. Agri. (1899), Howard; Mono. Culicid. I., p. 368 (1901), and Bull. No. 25, n. se., U.S. Dept. Agri. (1900), p. 28, Howard; Hndbk. Gnats, p. 240, 33 (1900), Giles; Les Moust., p. 395 (1905), Blanchard.

Additional localities.—New Hampshire (Dr. Dyar); Baltimore, Maryland; Boston Harbour, Massachusetts; Fort Hancock, New Jersey; Fort Logan H. Roots, Arkansas; Louisiana; Fort Morgan, Alabama; Fort Screven, Georgia; Fort Du Pont, Delaware; Florida; Fort Lincoln, N. Dakota; Maine; Fort Monroe, Virginia; Fort Miobrara, Nebraska; Rhode Island; S. Carolina (Miss Ludlow); Connecticut (H. L. Viereck).

Observations and life-history.—As previously mentioned (Vol. III., p. 247, 1903) this species is essentially a salt marsh insect. It, however, is capable of flying inland some distance, this migratory habit supplying mosquitoes to districts where none may breed.

It winters in the egg stage in the soft mud of the salt marshes.

The ova when first laid are white, but soon turn black and are spindle-shaped in form, slightly stouter at one end. As many as 200 may be laid by a single female.

Like *Grabhamia dorsalis* the eggs are never laid in water. Smith says they are deposited in low damp places, which fill up with snow and ice during winter or are filled by high spring tides. Mating takes place within twenty-four hours after hatching, and in a few days the females commence to oviposit. The summer eggs may lie for three months in mud and they *must* lie dry or nearly so for three or four days before they hatch. The larval stage lasts six days, and by the seventh day the pupa hatches according to Dr. Grabham. Professor Smith says this period varies from seven to ten days. If the pool dries up when the larva is just pupating, the creature may still hatch out, for the pupa

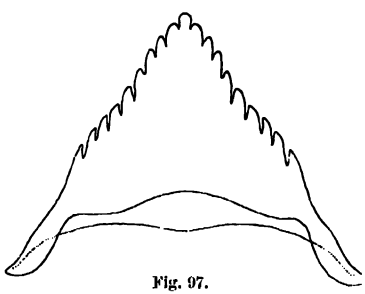


Fig. 97.
Labial plate.
Grabhamia sollicitans (after Felt).

can live twenty-four hours in damp mud. The number of broods depends on the weather and tides, as many as eight have been observed at Cape May.

The migrations of this species begin soon after the adults emerge. Great numbers hatch out uniformly, and do not bite until they have been fertilised by the males. On the first evening after copulation they arise in swarms and allow themselves to be carried by the wind, generally inland but sometimes out to sea. Although the wind mostly carries them, yet they do not merely drift, but actually fly, and even against a slight breeze.

Professor Smith states that the vast majority that migrate to the pine regions in New Jersey die without reproducing their kind after a life of about one month.

This species seldom occurs indoors. The larvae seem to be

particular as to their pools, partly due, no doubt, to the presence of natural enemies. They are not to be found in pools where fiddler-crabs run ; wherever high tides cover frequently ; wherever fish are carried in with the tide, and the solid, flat areas where water drains off completely in a day or so after the flooding. The favourite places are marsh-land broken up by little holes and pools, old ditches grass-grown at the mouth, and stretches left at the sides of roads and railways. The smaller, shallow,

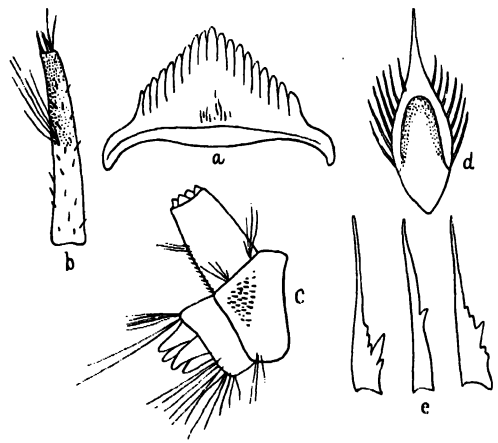


Fig. 98.

Grabhamia sollicitans. Walker.

a, Labial plate ; b, antenna ; c, apical segments and siphon ; d, scale of comb ; e, scale of siphon pecten (after Smith).

grassy ponds which are often dry are the most prolific breeding grounds.

As a rule the aquatic stages prefer clear water, but they may be found in foul and fermenting pools.

The *larva* is dirty-grey in colour, often with a whitish hue ; the head is yellow with or without markings ; siphon short, stout, and brown ; antennae short with a small lateral tuft of four rather long bristles ; anal gills short.

There are two rows of toothed spines on the siphon, from 16 to 24 in each row. The spines have from 1 to 5 teeth and may be slender or stout.

Scales of eighth segment from 20 to 40 in number ; each scale has an acute end and small lateral spines, seven in number.

Length.—8 to 9·4 mm.

The *pupae* sent me by Dr. Grabham have the siphons with oblique openings, the apices being swollen, and the broad anal plates with the central rachis projecting well beyond their edges. The pupal stage varies from one to three days.

GRABHAMIA SUBTILIS. Ed. and Ét. Sergent (1905).

Bull. d. Mus. d'hist. natur., p. 240, No. 4 (1905).

Thorax deep brown, with reddish-brown scales and two broadish parallel creamy lines. Head ochreous, with a dusky patch on each side.

Abdomen creamy scaled, with two dark patches on each segment. Legs with pale but indistinct banding, involving both sides of the joints. Ungues of ♀ all equal and uniserrate; of male, fore unequal, larger biserrate, smaller uniserrate; mid unequal, both uniserrate; hind equal, uniserrate.

♀. Head brown, with broad curved creamy scales in the middle, bright golden-brown ones at sides and then flat dull brown to creamy scales; upright pale forked scales and pallid hairs projecting between the eyes and narrow-curved scales between them; antennae deep brown, basal segment bright testaceous with small pale flat scales; palpi with scattered deep brown and creamy scales and black bristles; proboscis ochreous, black on apical third; clypeus deep brown; eyes purple.

Thorax deep brown, with rich golden-brown narrow-curved scales, except for two broad median lines of pale creamy ones which meet in front of the thorax and golden-brown chaetae over the wings; scutellum with pale creamy and rich golden-brown narrow-curved scales; pleurae brown with dense flat white scales.

Abdomen with pale creamy basal bands, yellowish apical bands, a median pale line and pale lateral scales, shutting in two dark scaled squarish areas to each segment, which are, however, indistinct on the last two segments, and the others have also a few scattered pale scales on them; basal segment white scaled; venter pale ochreous.

Femora and tibiae mottled with creamy and dark brown scales; fore and mid legs with a pale band involving the first and second tarsal joints, and another involving the joint of the second and third tarsal; in the hind legs the banding is more pronounced and the last tarsal is entirely white. Ungues all equal and uniserrate.

Wings with mixed creamy-white and deep brown scales; fork-cells short, the first sub-marginal longer and narrower than the second posterior cell, its base about level with that of the latter, its stem less than half the length of the cell; stem of the second posterior cell about two-thirds the length of the cell; supernumerary cross-vein a little behind the mid, the mid longer than the posterior and about its own length distant from it.

Length.—4 to 5 mm.

♂. Sergent says of the male palpi: "Ils sont de la longueur de la trompe, et leurs deux derniers articles sont légèrement renflés et couverts de plusieurs touffes de poils."

In the legs the only difference is that the fore ungues are unequal, the larger biserrate, the smaller uniserrate; in the mid legs both are uniserrate and still more unequal; hind ones equal and uniserrate.

Length.—4 to 5 mm.

Habitat.—Algeria (MM. Edmond and Étienne Sergent).

Observations.—Described by MM. Edmond and Étienne Sergent. This description is redrawn from specimens kindly sent me by them.

It comes very near *G. willcocksii*, but has wider pale thoracic lines and the male ungues differ considerably, in being uniserrate behind and the fore larger, biserrate; from *G. pulcritarsis* it also differs in both male and female ungues.

The Sergents give the following notes on the biology: "Moustique fort sanguinaire et sachant traverser des moustiquaires infranchissables pour d'autres Culicides de même taille. Il pique en plein jour, et surtout la nuit.

Œufs.—Les œufs sont pondus agglomérés en nacelles, et non pas isolés comme c'est le cas chez les autres *Grabhamia*. L'extrémité inférieure de l'œuf est plus grosse que la supérieure.

Larves.—Gîte: à Biskra, trous d'eau creusés aux pieds des palmiers, et où l'eau séjourne dix à vingt jours, après quoi le trou est à sec; une nouvelle irrigation y amène de nouveau l'eau de la séguia pour, à peu près, le même temps. Le siphon respiratoire de la larve est court, trapu et légèrement olivaire; il porte, à sa partie ventrale (interne par rapport à l'axe du corps de la larve), deux rangées parallèles d'épines, dirigées selon l'axe du siphon. A l'extrémité apicale de chaque rangée d'épines, il y a un bouquet de 6 poils. Les bourgeons anaux sont petits.

L'attitude de la larve dans l'eau est oblique, souvent presque verticale."

GRABHAMIA WILLCOCKSII. n. sp.

Thorax clothed with bright golden-brown and ochreous or creamy scales; in the middle there are two lines of a pale creamy hue; pleurae pale with grey scales. Abdomen mostly pale scaled, but with two more or less distinct dark areas on each segment. Legs with apical and basal pale bands; ungues are equal and uniserrate in the ♀. Wings mostly pale scaled, a few scattered dusky ones, but variable. Ungues of ♀ all equal and uniserrate; of male, fore and mid unequal and uniserrate; hind equal and simple.

♀. Head deep brown, clothed with pale creamy narrow-curved scales and pale creamy upright forked scales on the occiput, becoming bright ochreous laterally, and a few deep black ones behind on each side, flat creamy and dusky lateral scales. Palpi mottled with dark and creamy scales; proboscis mostly ochreous scaled, with a few scattered dark scales, the apical region black; antennae brown.

Thorax black, densely clothed with bright golden-brown narrow-curved scales, except for two creamy lines running nearly the whole length of the thorax and widest in front; scales in front of the scutellum much paler; traces of brighter scaled lines also laterally in some specimens; scutellum with pale creamy scales; chaetae bright reddish- to golden-brown; metanotum bright brown; pleurae brown with flat white scales.

Abdomen brown, mostly clothed with ochreous and white scales, the latter form a median line and a large patch either median or basal laterally, the ochreous ones more confined to the apical borders of the segments, the dark scales form more or less marked dorsal lateral dark areas, but pale scales may be dotted about over these; basal segment with two tufts of flat white scales; venter mostly creamy scaled.

Legs with the femora ochreous, with a few scattered black scales; femora dark brown with scattered white scales above, mainly ochreous with a few dusky scales below; first tarsals with more dark scales, in the fore and mid legs there is a pale band involving both sides of the first and second tarsals, and another involving the joint between the second and third tarsals, rest dark scaled; in the hind legs the bands are wider and extend to all the joints, the last tarsal being pure white; ungues on all the legs equal and uniserrate.

Wings with the majority of the scales pale creamy, some

bright ochreous ones on the costa and first long vein and some scattered black ones here and there on the other veins; fork-



Fig. 99.
Wing of *Grabhamia willcocksii*. ♀. n. sp.

cells short, the first sub-marginal longer and narrower than the second posterior cell, its base nearer the apex of the wing than



Fig. 100.
Male genitalia.
Grabhamia willcocksii. n. sp.

that of the second posterior cell, its stem about three-fourths the length of the cell; stem of the second posterior about two-thirds the length of the cell; mid cross-vein longer than the

supernumerary or posterior, the latter about its own length distant from the mid; halteres with slightly fuscous apex clothed with grey scales and a dark line on the ochreous stem.

Length.—3 to 4 mm.

♂. Palpi straw-coloured, a narrow dusky band at the apex of the penultimate and antepenultimate segments and some dusky scales at the apex, apical segment shorter than the penultimate; hair-tufts moderate, flaxen. Antennae with flaxen hairs.

Abdomen with basal grey bands and most of the apical segments grey scaled. Genitalia with rather long, narrow basal

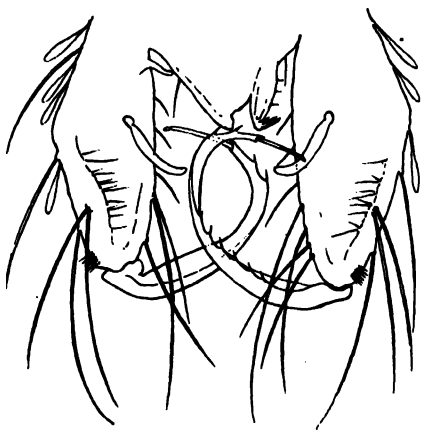


Fig. 101.
Male genitalia of *Grabhamia mariae*. Sergent.

lobes, long claspers curved apically with long terminal spine; harpes prominent, curved, broadened at the middle. Ungues of fore and mid legs unequal, uniserrate; hind ungues equal and simple.

Length.—4·5 to 5 mm.

Time of capture.—June.

Habitat.—Kafr el Dawar, Egypt (F. Willcocks).

Observations.—Evidently a most variable species in regard to the amount of pale coloured scales on the wings, legs and abdomen. It comes very near *Grabhamia pulcripalpis*, Rondani, but the hind tarsi have serrated ungues, separating it also from *G. pulcritarsis*, Rondani.

The nearest species to it are *G. subtilis* and *G. mariae*,

Sergent, but it differs in having narrower thoracic pale vittae, in the male having only uniserrate fore ungues and simple, not serrate, hind ones and in the male genitalia.

GRABHAMIA TAENIAROSTRIS. n. sp.

Head dusky yellowish-brown with a dark patch on each side; proboscis with a sharply defined broad median pale band. Eyes brilliant red and blue. Thorax brown with yellowish-brown scales and a deeper rich brown patch on each side. Abdomen deep rich brown with pale basal spots and apical creamy lateral spots. Legs brown with narrow apical and basal pale yellow bands. Wings with a brownish tinge and mottled brown and creamy scales.

♀. Head deep brown with narrow-curved pale dusky yellowish scales, dusky forked scales, ochreous at the tips, becoming deep brown at the sides over a dark patch of flattened scales, then dull creamy flat ones; around the eyes the narrow-curved scales are denser and brighter, especially in the middle; eyes brilliant red and blue; proboscis deep brown with a broad, sharply defined pale median band, and a few pale scales at the apex, labellae testaceous.

Antennae deep brown with pale pubescence and deep brown verticillate hairs; palpi black with white scales at the apex.

Thorax deep rich brown with dull golden to yellowish-brown narrow-curved scales, a large patch on each side in front of rich brown ones, the scales becoming darker, to almost black in front of the scutellum; chaetae black especially dense over the roots of the wings.

Scutellum with narrow-curved jet black scales, except on the middle of the posterior border of the mid lobe; metanotum deep brown.

Abdomen deep brown with small median basal creamy yellow spots and with creamy yellow apical lateral spots which spread out to form irregular narrow yellow apical bands only a few scales deep; border-bristles golden, short in the middle, long at the sides; venter mostly yellow scaled.

Legs deep brown, a few pale scales here and there; tarsi with narrow apical and basal yellowish bands except on the end segment; ungues equal and simple.

Wings with mottled brown and creamy yellow scales, the former predominating apically; first sub-marginal cell longer and narrower than the second posterior cell, its base a little nearer

the apex of the wing, its stem a little more than half the length of the cell, as also is the stem of the second posterior; the posterior cross-vein three times its own length distant from the mid.

Halteres with pale stem, the knob fuscous below, creamy above.

Length.—6 mm.

Habitat.—Peradeniya, Ceylon (E. E. Green).

Time of capture.—January.

Observations.—A very marked *Grabhamia*, easily told by the pronounced proboscis band, thoracic and abdominal ornamentation. The jet black narrow-curved scales on the back of the mesonotum and scutellum are also very characteristic.

GRABHAMIA OCHRACEA. Theobald (1905).

Journ. Econ. Biol. Vol. I., No. 1, p. 35 (1905).

Head tawny, with yellowish-grey scales; proboscis with an ochreous band in the middle, black apically, brown basally. Thorax ornamented with bright ochreous brown and silvery grey scales, the ochreous area forming two more or less distinct dusky spots in front, and others close to them, also two spots in front of the wings. Abdomen bright golden ochreous, with traces of a dark band on the fourth segment and two dark spots on the apical segment. Legs ochreous, the tarsal segments darker except at their bases and apices. Wings with brown scales and some scattered ochreous ones, especially along the base of the costa, where they form a more or less distinct pale line.

♀. Head clothed with pale yellowish-grey narrow-curved scales, ochreous upright forked scales in the middle, brown ones at the sides, with numerous pale golden and brownish bristles projecting forwards; palpi with mottled brown and ochreous scales, the latter most prominent on their upper surface; clypeus tawny; proboscis clothed with black scales apically, rich ochreous ones in the middle, and mixed ochreous and dusky ones basally, thus giving a distinctly banded appearance.

Antennae brown, ochreous basally.

Thorax ochreous brown, clothed with narrow-curved rich ochreous brown and silvery grey scales, arranged as follows:—Two spot-like areas of rich ochreous brown scales in front, others behind in conjunction with a patch of dusky ones just in front of the root of the wings, the silvery grey ones fitting in between; bristles brown and golden; scutellum pale, with pale narrow-curved scales and a few dusky ones at the base of the mid lobe,

border-bristles golden brown, eight to the mid lobe; metanotum pale brown; pleurae ochreous-grey and pale brown, with patches of small flat grey scales.

Abdomen completely clothed with bright golden-ochreous scales, except for a median patch of dusky ones on the fourth and two spots on the apical segment, with traces of pale scales at the base of the latter and sides of the preceding, hairs bright golden yellow.

Legs pale ochreous, femora with scattered dusky scales at the apex, also some at the base and apex of tibiae, second and third tarsals dusky in the middle, pale at each end, fourth tarsal pale at the base, dusky at apex, fifth tarsal deep brown; ungues equal and simple.

Wings with brown scales, the costa and first long vein mottled with pale ochreous; third and fifth long veins very dark scaled; first sub-marginal cell longer and narrower than the second posterior, their bases nearly level, stem of the former a little more than half the length of the cell, stem of the latter about two-thirds the length of the cell; posterior cross-vein nearly three times its own length distant from the mid; scales on the base of the costa pale ochreous, and many along its upper part, also many pale scales on the first long vein, and a few seen in certain lights on the other veins.

Halteres pale ochreous.

Length.—5·5 mm.

Habitat.—India (Dr. Christophers).

Observations.—Distinguished from all other *Grabhamias* by its very marked golden ochreous abdomen. Described from two perfect females.

GRABHAMIA PULCHRITARSIS. Rondani (1872).

Culex pulchritarsis. Rondani (1872).

Culex leucacanthus. Loew (?) (1873).

Bull. Soc. Ent. Ital. IV., 31, 8 (1872), Rondani; Wien. Ent. Zeit. XII., 170 (1893), Strobl.; Bull. Soc. Ent. Ital. XXVIII., 265, 15 (1896) and XXXI., 181, 6 (1899); Noè, Bull. Soc. Ent. Ital. XXXI., 247 (1899); Gnats, p. 274, 67 (1900), Giles; 2nd Edit. III., p. 425, 63 (1902); Mono. Culicid. II., 12, 5, 6 (1901), Theobald; Állattan, Közl. III., p. 55 (1904), Kertész; Entom. Zeitschr. XVII., 33, 1 (1873), Loew et Esch.; Europ. Dipt. III., 1, 1 (1873), Loew. (*leucacanthus*).

Head clothed with large narrow-curved pale yellowish-grey scales almost white around the eyes. Thorax densely clothed

with narrow-curved pale creamy-grey scales with traces of two slightly darker areas in front. Abdomen deep brown with basal white bands constricted in the middle spreading out laterally. Legs with apical and basal banding. Wings speckled with grey scales. Ungues uniserrated.

♀. Head brown clothed with broad curved scales of a pallid yellowish-grey hue and with similar coloured upright forked ones behind and flat white ones at the sides; palpi deep brown, their apex with white scales; proboscis deep brown with scattered white scales on the middle and on its basal area; antennae brown, three basal segments testaceous, the two last ones with small flat white scales.

Thorax brown in front, testaceous behind, densely clothed with narrow-curved pale creamy-grey scales, in front two slightly defined small areas of yellow scales; scutellum bright testaceous with narrow-curved pale scales; metanotum pale ochreous; pleurae ochreous with patches of flat white scales.

Abdomen deep brown with broad basal white bands much constricted in the middle and spreading out laterally in the fifth and sixth segments; most of the area is composed of the pale scales, apical segment mostly pale scaled; venter clothed with creamy-white scales; hairs of the abdomen pallid.

Legs deep brown speckled with grey scales and the first tarsals of the fore legs, also the next two tarsals with apical and basal pale bands, the fourth tarsal with basal pale band, the fifth unbanded; in the mid legs the same; in the hind the last tarsal is all dull white; the femora and tibiae have also a pale apical spot and the coxae are bright testaceous; fore and mid ungues equal and uniserrated; hind simple.



Fig. 102.
Apex of wing of *Grabhamia pulchritarsis*. Rondani. ♀.

Wings with the first submarginal cell longer and narrower than the second posterior cell, its base just a little nearer the apex of the wing, its stem about half the length of the cell; stem of the second posterior also about half the length of the cell; posterior cross-vein about one and a half times its own length distant from the mid; the veins mottled with brown and grey scales. Halteres ochreous.

Length.—4·5 to 5·5 mm.

♂. Thorax and abdomen much as in the ♀. Palpi with the two apical segments swollen, the penultimate one hairy, especially on one side, and also the apex of the ante-penultimate; brown with narrow basal white bands to the last two segments and traces of a broader pale band on the long penultimate one; hair-tufts golden brown; antennae with flaxen plume-hairs.

Legs as in the ♀ but the last hind tarsal not all white, there being a minute black apex; fore and mid ungues unequal, both uniserrated; hind equal and simple.

Length.—5 to 6 mm.

Habitat.—Novi, Orsova and Budakesz, in Hungary (Kertész); Italy (Rondani and Ficalbi).

Time of capture.—July (Kertész).

Observations.—These are the only specimens I have seen. It is clearly distinct from the other related species of *Grabhamia*, and can easily be told by the pale-scaled head and thorax and abdominal banding. The head scales are also characteristic and resemble those of *maculosa*.

GRABHAMIA LONGISQUAMOSA. Theobald (1905).

Ann. Mus. Nat. Hung. III., p. 102 (1905).

Head creamy yellow scaled with a dusky patch on each side; thorax clothed with dense brassy scales, paler in front of the scutellum; pleurae with white patches. Abdomen almost entirely clothed with creamy scales, venter pale scaled. Legs brown with scattered pale scales and pale banding involving both sides of some of the joints, but faint; apical tarsal segments deep bronze brown; (hind one?). Wings with the veins with mixed coloured scales, the creamy ones predominating.

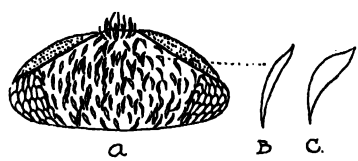


Fig. 103.
Grabhamia longisquamosa. ♀. Theobald. a, Cephalic armature; b and c, head scales.

♀. Head brown, densely clothed with long creamy narrow-curved scales which become ochreous at the sides, and then follow ochreous and grey small flat scales, thin creamy and ochreous upright forked scales and pallid bristles; antennae brown, the two basal segments ochreous with small flat grey scales; palpi testaceous with black and grey scales, the apex white scaled, bristles black;

the proboscis deep brown, mottled in the middle and down to the base with grey scales.

Thorax deep brown, densely clothed with a thick coating of brassy narrow-curved scales which become broader and paler (almost creamy) before the scutellum; scutellum brown with narrow-curved pale scales; metanotum bright brown; pleurae deep brown with patches of flat white scales, which also occur on the prothoracic lobes.

Abdomen deep brown clothed with creamy scales, with a few black ones here and there; basal segment dusky with flat creamy scales; venter dark brown with dense flat creamy-white scales.

Legs ochreous brown mottled with deep brown and creamy scales, all the tarsal segments dark bronzy-black with traces of apical and basal pale banding except on the last two segments of the fore and mid legs; hind legs very similar (but last two segments absent); fore and mid ungues equal and uniserrated.

Wings with the veins speckled with dark and light scales, the latter by far the most numerous; fork-cells short, first sub-marginal very slightly longer and narrower than the second posterior cell, its stem as long as the cell, its base very slightly nearer the apex of the wing; stem of the second posterior slightly longer than the cell about its own length distant from the mid-cross vein; halteres with dusky grey stem and fuscous knob.

Length.—6 mm.

Habitat.—Sousse, Tunis (Biró).

Time of capture.—February (28th).

Observations.—Described from a single ♀. The brassy thorax is very pronounced. From *G. pulchritarsis*, Rond., it can be told at once by the very long narrow-curved head scales. The legs have a deep bronzy-purple hue on the tarsi in some lights, the banding being dull white and often scarcely perceptible in some lights. The majority of the vein scales are light and so give the wings a light appearance.

GRABHAMIA FLAVIFRONS. Skuse (1889).

Culex flavifrons. Skuse (1889).

Proc. Linn. Soc. N. S. Wales, III., p. 1735 (1889), Skuse; Mono. Culicid. I., p. 421 (1901), Theobald.

Head with golden scales in the middle, brown ones at the sides; proboscis dark at the apex with many pale scales on the

basal area. Thorax deep brown with rich golden-brown scales, no definite ornamentation. Abdomen deep brown with irregular basal pale scales, extending apically and scattered over the last two segments; venter with numerous pale scales. Legs brown with scattered pale scales and basal pale bands. Wings with brown and yellow scales.

♀. Head deep brown with large pale creamy and golden narrow-curved scales, with upright forked scales on the occiput, darker at the sides giving a dark hued appearance to them, flat pale scales at the sides and some brown and golden chaetae projecting forwards; palpi deep brown with white scaled apex and a narrow white band towards the base and some long brown chaetae; proboscis black at the apex with scattered pale scales on the basal two-thirds; antennae brown with pallid bands and pale creamy scales on the basal segment.

Thorax deep brown with narrow-curved golden scales all over it, paler in front of the scutellum; scutellum pale brown with pale creamy scales and brown border-bristles; pleurae brown with flat pale scales. Metanotum brown.

Abdomen deep brown with pale creamy scales at the bases of the segments irregularly disposed and spreading out laterally, last two segments with many pale scales; basal segment pale brown with scattered pale creamy and a few dark dusky scales and pale golden hairs. Venter mostly pale scaled.

Legs with mottled brown and creamy femora and tibiae, the fore and mid first tarsals and the fore two following tarsals with narrow yellowish pale basal bands, the hind legs with an extra pale band on the third tarsal. Ungues of the fore and mid legs equal and uniserrate, of the hind equal and simple.

Wings with yellow scales scattered amongst the brown, with dense large broad spatulate and narrow linear scales. The broad spatulate scales are evidently the median vein scales widely expanded. First sub-marginal cell longer and narrower than the second sub-marginal cell, their bases nearly level, stem of the first fork cell about three-fourths the length of the cell; stem of the second posterior two-thirds the length of the cell; posterior cross-vein not quite as long as the mid about its own length distant from it.

The wings are noticeable for the fact that the scales are larger than in most *Grabhamias*. Halteres pale creamy.

Length.—4·8 mm.

Time of capture.—December.

Habitat.—South Queensland (Dr. Bancroft).

Observations.—Redescribed from a perfect ♀ sent me by Dr. Bancroft. It can at once be told from all known Australian



Fig. 104.
Wing of *Grabhamia flavifrons*. ♀. Skuse.

mosquitoes by the wing scales and is somewhat aberrant from the genus *Grabhamia* on account of the larger size of the alar scales.

It comes very near other *Grabhamias*, in general appearance but the uniformly ornamented thorax is very pronounced.

GRABHAMIA VITTATA. Theobald (1903).

Canad. Ento., p. 313, Nov. (1903).

Thorax clothed with rich reddish-brown scales and with two narrow broken creamy lines and a few pale scales at the sides, especially over the roots of the wings; pleurae with dense grey scales. Abdomen blackish-brown with basal white bands; venter white. Legs brown, base of femora pale, remainder of femora and tibiae mottled with white scales; some of the tarsals with basal white bands; last hind tarsal black; ungues of ♀ all uniserrated; of ♂ all uniserrated.

♀. Head brown with narrow-curved yellowish scales, palest in the middle, with numerous upright yellow and black forked scales, flat creamy-white lateral scales with a round patch of flat black ones in the middle of each white area, a pale border along the eyes, black bristles projecting over them, except in the middle where the bristles are golden; antennae deep brown, basal segment and base of the second segment bright testaceous; proboscis deep brown; palpi deep brown towards the apex; joints testaceous, with a few golden and black hairs, apical segment long, as long as the rest of the palpus.

Thorax deep brown, clothed with bright reddish-brown narrow curved scales, a narrow median black line and a narrow line of creamy scales on each side, also a few creamy scales in front, over the root of the wings and before the scutellum; four rows of long dark bristles on the posterior half of the mesonotum; scutellum brown with narrow-curved pale creamy scales and long dark posterior border-bristles; metanotum pale brown; pleura fawn coloured, densely white-scaled.

Abdomen deep blackish-brown with basal white bands and a few yellow scales on the apices of the last three segments; border bristles pallid; venter densely clothed with creamy-white scales.

Legs with the pale coxae, with creamy scales; femora pale basally and ventrally, with scattered brown scales becoming densest towards the apex, extreme apex with a yellow spot; tibiae brown, mottled with pale scales, darkest towards the apex and with black bristles; first fore tarsal and two following tarsal segments with narrow pale basal bands; mid-tarsals the same as the fore; hind legs with a pale basal band to the first tarsals and next three segments, last segment black; all the ungues uniserrated.

Wings with brown scales except on the sub-costal vein and one side of the first long vein, where they are mainly white, and also at the base of the costa; the lateral vein-scales on the second, third, fourth and apex of the fifth veins long; the first, third and fifth long veins with darker scales than the remainder; fork-cells short, the first sub-marginal cell longer and narrower than the second posterior cell, its base about level with that of the latter, its stem slightly longer than half the length of the cell; stem of the second posterior about the same length as the cell; posterior cross-vein rather more than its own length distant from the mid cross-vein; fringe dense, brown. Halteres with pale testaceous stem and fuscous knob.

Length.—4·2 to 5·5 mm.

♂. Palpi brown with a white band at the base of the two apical segments, plume-hairs brown, yellow opposite the pale basal areas, there is also a pale band on the long antepenultimate segment, the last two segments of nearly equal length, the apical one slightly the shorter; apex of the antepenultimate swollen. Antennae with brown plume-hairs tipped with greyish-yellow; scales of the head grey. Thorax with looser, more scattered reddish-brown scales in the middle, grey ones at the sides.

Abdomen as in the ♀. Legs banded as in the ♀, but the pale basal bands more of a yellow hue.

Fork-cells very small; first sub-marginal cell a little longer and much narrower than the second posterior, its base a little the nearer the apex of the wing, its stem a little longer than the cell; stem of the second posterior cell also longer than the cell; posterior cross-vein about one and a half times its own length distant from the mid.

Fore and mid ungues unequal, both uniserrated, the larger mid ungues rather straighter than the much curved fore ones; hind ungues equal, prominently uniserrated. Basal lobes of genitalia very hairy, claspers narrow, thin, terminating in a longish spine.

Length.—4·5 to 5 mm.

Habitat.—Pecos Canon, New Mexico, U.S.A.

Time of capture.—June 16th to 29th.

Observations.—A very abundant species, according to Dr. Grabham, caught after sunset. It varies very much in size, the smallest specimen being 4 mm., the largest 5·5 mm. The ♂ has evidently a variable adornment on the thorax, and is peculiar in having the hind ungues uniserrated.

The species can easily be told from any other *Grabhamia* with banded legs by the basally-banded abdomen and last hind tarsal being black and by the white-scaled sub-costal and first long vein. *G. dorsalis*, which it most nearly approaches, has the abdomen and thorax with different adornment and the legs basally and apically banded, not basally as in this species.

The type is in the British Museum (Nat. Hist.).

The larva.—Head deep chestnut brown, eyes black, reniform, pale around; antennae pale testaceous at the base, dark at the apex, terminating in two small spines and a third larger flattish pointed one, paler in colour; there is also a long lateral spine about half way down the antenna; mouth whorls bright golden-yellow; thorax and abdomen pale brown with a double darker dorsal line, the front of the thorax with four tufts of black hairs in the middle in front, then two separate hairs and then another tuft on each side, two pairs of long lateral tufts, the first pair with two single black bristles just behind them and a little more centrally placed; the first two abdominal segments with large lateral tufts, remainder with small ones; siphon short and thick, deep brown, about as long as the penultimate and antepenultimate segments; a few tufts of hair near its base and also a patch

of characteristic spines. The last segment has a single dorsal tuft with a large bristle below it; the ventral fan rather long and prominent, four ventral small tufts.

Length.—When mature, 9 mm.

The *pupa* has cylindrical siphons contracted towards the apex, with small, slightly oblique, opening; there is a dense median tuft on the first abdominal segment. The anal fins are large, rounded, with median rib and double-contoured border towards the base of each fin; a distinct apical dorsal tuft on the last segment.

Length.—5 mm., with anal fins, 6 mm.

GRABHAMIA DISCOLOR. Coquillett (1903).

Culex discolor. Coquillett (1903).

Canad. Entomo., p. 256, Sept. (1903); Mosq. N. Y. State Agri. Exp. Sta., p. 193 (1904), Smith.

This species comes near *G. pygmaea*, but is clearly a very distinct and marked species easily told by the *spots* of dark scales on the wings.

I have been unable to obtain any specimens, so the original description is appended; a much fuller one has been given by Smith, whose figures of adult and larval characters are reproduced here.

Coquillett's description :—

"Female: differs from *nanus* as follows:—Palpi with a cluster of white scales at the apices, upright scales of occiput yellow, whitish cross-bands of abdomen prolonged forward in the middle, crossing or almost crossing the segments, scales on posterior side of front and middle tibiae, and on anterior side of the hind ones almost wholly pale yellow, first tarsal segment bearing many yellow scales, black and yellow scales of wings not evenly distributed, the black ones forming a distinct spot at forking of the second vein with the third, another on upper branch of fifth vein at the hind cross-vein, and a third on the apical third of the last vein, remaining scales of this vein wholly yellow; length 4 mm. A specimen from Delair, New Jersey, received from Prof. Smith.

"*Type.*—No. 6894, U.S. National Museum."

Smith gives the size as 4 to 6 mm. and the fuller following details :—

"Occiput covered with yellowish scales. Palpi in ♀ 4-jointed, rather broad, terminal segment reduced to an extremely small circular knob (a generic character.—F. V. T.). Palpi in ♂ 3-jointed, the basal

segment only slightly longer than the two terminal ones together, the fan-like tufts towards the tips brownish-black in colour. Thorax dark brown irregularly striped with yellow scales. The abdomen is apically banded with yellowish-white, the bands prolonged forwards in the middle and intersected irregularly with the dark brown of the basal part; in some specimens this intersection is carried further, so that the brown predominates, giving the abdomen a mottled appearance; sometimes the

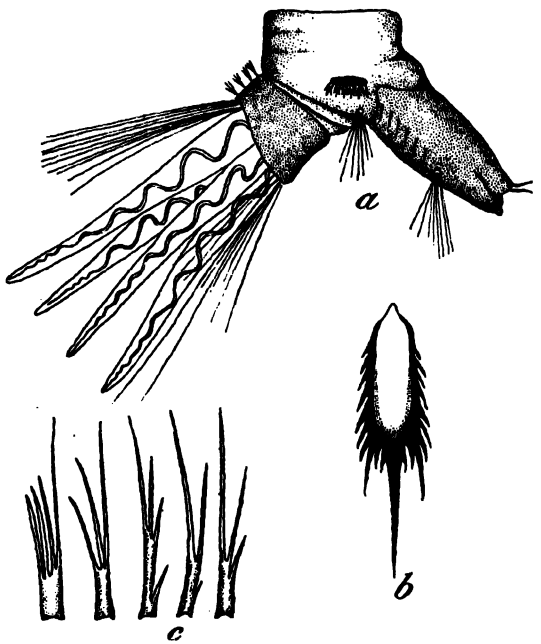


Fig. 105.
Larval characters of *Grabhamia discolor*. Coquillett.
a, siphon etc.; b, scale of 8th segment; c, siphon scale.

brown is carried across the base of the segment, almost dividing the band in two.

"Male ungues are alike in the anterior and mid tarsi, the larger biserrate, the smaller uniserrate; posterior equal and simple."

The account of the wing is as follows:—

"Hyaline, the scales collected into black and white portions as follows:—Costa black centrally; sub-costa black, the outer two-thirds divided twice with a white portion; radius 1, basal half white, the black beginning before the fork with radius 2, and extending to wing margin; radius 2, black at basal third, also black at fork with radius 3; radius 3

black at basal and apical third; radius 4 and 5, black at apical two-thirds; media 1 and 2 black, beginning a short distance from base and extending to cross-vein, black again a little on each side of fork with media 3, and again at margin; media 3 black at both ends. Cubitus 1, black, beginning a short distance from base and extending to fork with cubitus 2, white for a short distance, then black to cross-vein, and again at margin; cubitus 2 slightly black at tip and anal vein black at apical fourth. The black at the forks, radius 2 and 3 and media 1 and 2 and 3 are so close together that they appear as distinct spots."

Observations.—This species has been bred from larvae. Nothing is known of the habits of the adult, or whether or not it bites. The larvae were taken by Mr. William P. Leal in June and July at Delair, N.J. The pupae formed on June 23rd and 24th and imagines hatched on the 27th and 28th—a pupal period of four days. The second lot (July) received by Professor Smith did not thrive, one hatched out on August 8th. The larvae are noticeable by their white antennae which are very prominent, by their long thin anal gills, and by their habit of resting on the bottom, back downwards, antennae pointing upwards and mouth brushes kept in constant motion. They feed at or near the bottom.



Fig. 106.
G. discolor. Coquillett.
a, antenna; b, labial plate of larva.

In colour the larva is yellowish-brown when full grown. Length 7 to 8 mm. Head pale yellow, no markings. Antennae large, with small stout spines, thickest centrally and twice curved, terminating almost in a point; lateral tuft below the middle; mentum with eight teeth on each side of apex. Lateral comb of eighth segment consists of 5 to 8 scales only arranged in form of an arc on a separate band; the scales have a long terminal spine and two shorter ones apical, and side spines still smaller and two small ones between the long apical ones. Siphon very small, three times as long as broad, with two apical curved spines; the pecten with 5 to 8 spines, each with long teeth (2 or 3). Anal gills long, twice as long as siphon. The larva

approaches *G. jamaicensis* and other *Grabhamias* in the long anal gills.

GRABHAMIA MACULOSA. Theobald (1904).

Ann. Mus. Nat. Hung. III., p. 105 (1904).

Head clothed with narrow-curved bright brown scales, with some creamy ones behind, flat creamy lateral scales with a small black spot. Proboscis and palpi brown speckled with white. Thorax deep brown densely clothed with narrow-curved bright brown scales, with traces of two pale lines behind. Abdomen deep brown with scattered creamy scales, most dense basally and apically. Legs brown with scattered creamy scales, bases and under surface of femora creamy; ungues uniserrated.

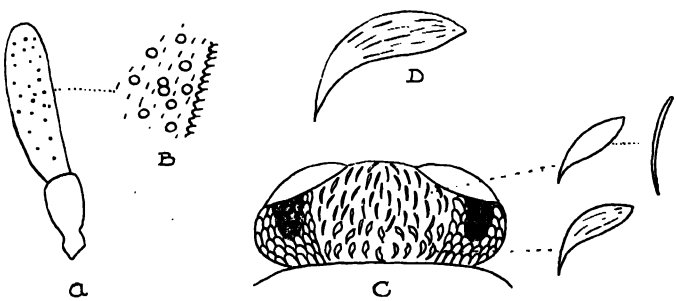


Fig. 107.

and B, Female palp; C, head; D, enlarged cephalic scale of *G. maculosa*. Theobald

♀. Head deep brown clothed with large narrow-curved scales reddish-brown in colour, but some creamy behind, those in front all pointing uniformly forwards, those behind irregular, in front ochreous upright forked scales, behind they are black; at the sides flat creamy scales with a small spot of black ones. Palpi black with scattered white scales; apical segment large, nearly twice as long as the penultimate; proboscis deep brown with scattered creamy scales. Antennae deep brown, basal segment with flat creamy scales.

Thorax deep blackish-brown with narrow-curved golden-brown scales, those in front of the scutellum broader like those on the head and creamy, in certain lights there are traces of two pale scaled parallel lines behind; scutellum paler brown with large narrow-curved creamy scales and golden-brown border-

bristles; metanotum deep brown; pleurae and prothoracic lobes densely scaled with flat white scales.

Abdomen black scaled with scattered creamy white scales all over but forming prominent basal bands and narrower apical ones as well, basal segment bright testaceous with scattered flat white scales; border-bristles pale; venter dark with scattered creamy white scales all over.

Legs mottled with brown and creamy white scales, the femora and the tibiae with more pale scales than the tarsi, all the segments pale scaled beneath; ungues thick, equal, uniserrated.

Wings rather densely scaled with brown and creamy scales, giving the veins a mottled appearance; first sub-marginal cell considerably longer and narrower than the second posterior cell, its base about level with that of the latter, its stem about half



Fig. 108.
Wing of *Grabhamia maculosa*. ♀. Theobald.

the length of the cell; stem of the second posterior cell nearly as long as the cell; supernumerary and mid cross-veins meet at an angle, the posterior not quite its own length distant from the mid; scales at the base of the veins creamy. Halteres with pale stem and fuscous knob.

Length.—6 to 6·5 mm.

Habitat.—Sfax, Tunis (Biró).

Observations.—Described from five perfect ♀'s, one dissected and mounted in balsam. They are large conspicuous mosquitoes looking like *Culex cantans*, Meigen, etc., which have densely scaled wings and similar palpi. The complete speckling of the abdomen, legs, wings and palpi should at once separate it from all other known *Culicidae*. It is best placed in this genus, but the ♀ palpi are apparently only two-jointed, the two basal segments being fused.

Genus **PSEUDOGRABHAMIA.** Theobald.

Journ. Bomb. Nat. Hist. Soc., p. 244 (1905).

Head clothed with narrow-curved, upright forked and flat lateral scales. Mesothorax with narrow-curved scales; scutellum with small flat scales only on the lateral lobes, small flat ones on the mid lobe, except along the posterior border where there are narrow-curved scales; metanotum nude. Wings with rather broad cone-shaped scales especially on the basal half of the veins, thin lateral ones on the apical halves and rather broader ones on the stems of the fork-cells: fork-cells short. Male palpi with the two apical segments rather swollen, also the apex of the antepenultimate; the apical segment bluntly acuminate, both end segments with hair-tufts and also hairs on the apex of the antepenultimate segment.

This genus looks very much like *Grabhamia*, but can at once be told by the scutellum having small flat scales, not all narrow-curved ones as in that genus.

Pseudograbhamia maculata. Theobald (1905).

Journ. Bomb. Nat. Hist. Soc., Vol. XVI., p. 244 (1905).

Thorax reddish-brown with two rather indistinct small pale spots; pleurae with silvery puncta. Abdomen with basal white bands. Legs with mottled scales and basal white bands. Wings short with small fork-cells; scales mottled. Antennae of ♂ flaxen; palpi brown with three narrow pale bands; apical segment acuminate.

♀. Head brown with scattered greyish-white, rather broad narrow-curved scales, very small narrow-curved golden ones around the eyes and numerous black upright forked scales. Antennae deep brown, the basal globular segment black to brown, the base of the second segment bright testaceous. Clypeus black; proboscis with deep brown, black and scattered white scales. Palpi short, with deep brown scales, except at the apex where they are white. Thorax deep brown with very small reddish golden-brown narrow-curved scales nearly all directed posteriorly; ornamented with four round silvery grey spots on the mesonotum, similar coloured ones just in front near the head and another spot on the front of the root of the wings and scattered grey scales in front of the scutellum; pleurae

brown with grey puncta; scutellum with small flat white scales only on the lateral lobes, small flat white ones on most of the median lobe with a few narrow-curved pale golden ones on its apical edge, with bright brown border-bristles. Abdomen deep, blackish-brown with basal white bands and with short pale golden border-bristles.

Legs deep brown, the femora and tibiae and first tarsals with scattered pale scales, the knees white, first tarsals and next three tarsals of the fore and mid legs with basal pale yellow to almost white bands, last tarsal segment all deep brown; in the hind legs all the segments have basal white bands; ungues of the fore and mid legs equal and uniserrated, of the hind equal and simple. Wings short with the fork-cells short, the scales mottled brown and creamy grey; scales on the basal areas of the veins



Fig. 109.
Wing of *Pseudograbhamia maculata*. ♀. Theobald.

and the median paired ones cone-shaped and broad, the lateral ones on the apical halves linear and very narrow, except on the branches of the first fork-cell where they are broader; on the stems of the fork-cells they are much broader and cone-shaped; some of the scales are asymmetrical; first sub-marginal cell longer and slightly narrower than the second posterior cell, its base slightly nearer the apex of the wing, its stem about the same length as the cell; stem of the second posterior slightly longer than the cell; posterior cross-vein not quite its own length distant from the mid cross-vein.

Length.—3·8 to 4 mm.

♂. Antennae banded brown and grey, plume-hairs bright flaxen. Proboscis not mottled as in the ♀. Palpi long; the two apical segments and the apex of the penultimate slightly swollen: the apical segment about the same length but narrower

than the penultimate, the remainder of the palps looking like one long segment, the jointing being invisible owing to the scales; colour deep brown; creamy-white scales form an apparent band at the base of the two apical segments, and there is another very narrow pale band half-way down the remainder of the palps; the two apical segments have blackish plume-hairs, and also both sides of the apex of the ante-penultimate segment. Legs as in the ♀; fore and mid ungues unequal, both uniserrated; the hind ones simple (? equal).

Wings much as in ♀.

Length.—4·3 mm.

Habitat.—Galgamuwa, Ceylon (E. E. Green).

Time of capture.—August (1902).

Observations.—Described from two perfect ♀'s and one ♂. The species is very marked, but unless examined microscopically might easily be placed in *Grabhamia*, from which it is separated by the small flat scutellar scales.

Genus **APOROCULEX.** nov. gen.

Head clothed with narrow-curved scales, small flat lateral ones, and broadly expanded upright forked scales. Basal segment of antennae with small scales; prothoracic lobes with narrow-curved scales and chaetae; mesonotum with narrow-curved scales. Palpi short in ♀.

Wings with *Culex* venation, but the posterior cross-vein slopes prominently in basal direction. Wings with large spatulate scales on the first long vein; the median vein-scales large and spatulate, but absent on the branches of the *second* long vein, lateral vein-scales like *Culex*.

This genus is based on the squamose characters of the wings, whilst the unusual direction of the posterior cross-vein and the broadly expanded upright forked-scales may be taken as secondary generic characters.

The genus comes between *Culex* and *Grabhamia*.

Aporoculex punctipes. n. sp.

Head deep brown with some deep golden median scales; proboscis brown with a narrow pale median creamy band.

Thorax deep brown with faint golden ornamentation. Abdomen brown with basal pale bands to some of the segments. Legs with spotted femora and tibiae, and narrow pale bands involving both sides of the joints. Wings with large median vein-scales.

♀. Head deep brown with narrow-curved dull golden-brown scales which form a brighter golden median area, dusky upright forked scales, which show distinct violet reflections, and which are much expanded apically, and dull creamy and brown flat lateral scales; clypeus reddish-brown; palpi dark scaled with a few pale scales especially at the apex, and pale hued at the joints; antennae brown with pale internodes, basal segment dark on the inner side, bright testaceous on the outer, with a few small flattened yellow spindle-shaped scales; proboscis deep brown with a median creamy band.

Thorax black with narrow-curved deep bronzy scales and some rather irregular and indistinct patches of golden narrow-curved scales giving a somewhat ornamented mottled appearance, chaetae deep black, the golden scales form an indistinct line across the mesonotum just past the middle, and two spots just before the scutellum; the bare space with bronzy minute scales; prothoracic lobes prominent with black and a few golden chaetae, and with a few narrow-curved dull golden scales; scutellum black with narrow-curved bronzy scales on the base, and somewhat larger golden ones along the border; border-bristles black, the mid lobe with three large ones on each side, and two smaller median ones; metanotum dark brown; pleurae brown with some flat creamy scales.

Abdomen deep brown with a yellow band on the fourth to seventh segments, rather deeply constricted in the middle; the basal segment with two black patches of scales and brown bristles, the second with a creamy median triangular spot and traces of small pale basal scales, scarcely forming a band, the third with a few pale basal scales, scarcely noticeable, and there are pale scales at the sides; border-bristles pale.

Legs deep brown, femora and tibiae with pale spots, the joints with narrow pale bands involving to some extent both sides of the joints, but mostly basal; ungues equal and simple; femora and tibiae with short, dark spines.

Wings with the first sub-marginal cell much longer and narrower than the second posterior cell, its base slightly nearer the base of the wing, its stem less than one-third the length of the cell; stem of the second posterior cell about two-thirds the length

of the cell; posterior cross-vein slightly longer than the mid, about one and a half times its own length distant from it, and sloping

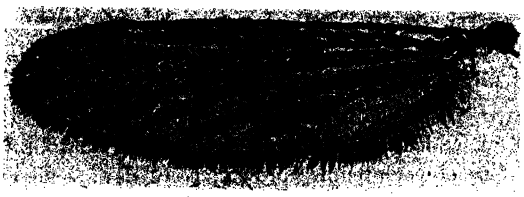


Fig. 110.
Pseudoculex punctipes. ♀. n. sp.

prominently backwards; scales of the first long vein large and dense, those of first fork-cell of *Culex*-form the stem and other veins with broad spatulate median vein scales.

Halteres with pale scales.

Length.—5 mm.

Habitat.—Chinde, British Central Africa (F. O. Stoehr).

Observations.—Described from a perfect ♀. It is very marked owing to the prominent spotted femora and tibiae, and peculiarly adorned abdomen, which under a hand lens looks as if unbanded. It somewhat approaches *Taeniorhynchus tenax*, Theob., in general appearance, but the wings at once separate it, and also the general adornment.

Larvae of this species have been sent taken in a cistern at Chinde, but as there are two kinds in the bottle, I do not know which belongs to this species.

Genus **CULICADA.** Felt.

Mosquitoes or Culicidae, N. Y. State, App., 1904, p. 391b, Felt; Journ. Eco. Biolo., Vol. I., p. 26, 1905, Theobald.

Head, thorax, and abdomen with similar scales to *Culex*. Wings with short fork-cells and clothed with denser and larger vein-scales than in *Culex*, the median vein scales especially so. The palpi of the female longer than in *Culex*, of four segments, the apical one small. The stem of the first sub-marginal cell is usually short, but may be a little longer or a little shorter than the cell.

The genus can at once be separated from *Culex* by the short fork-cells and the scale structure of the wings.

The characters given by Felt will not all hold even in the same species. For instance, "the posterior cross-vein about its own length from the mid cross-vein" is given as a generic character in the female; in *C. cantans*, Meigen, it varies to as much as its whole length; and in the male, again Felt says "the petiole of the first fork-cell is equal in length to that of the cell"; it in reality will vary not only in the same species, but in specimens from the same batch of eggs. The type of this genus should be Meigen's *cantans*, not my *Culex canadensis*.

The larvae in this genus have short thick syphons.

A number of species (24) come in this genus as *cantator*, Coq., *canadensis*, Theob., *nemorosus*, Meigen, *morsitans*, Theob., *diversus*, Theob., *annulipes*, Meigen, *vexans*, Meigen, and *lutescens*, Fabricius, etc.

Felt gives the following American species, which belong here, namely, *fitchii*, Felt, *cinereoborealis*, Felt, *onondagensis*, Felt, *aberratus*, Felt, and *lazarensis*, Felt. Others he refers to that certainly do not belong here are *squamiger*, Coq., *triseriatus*, Say, *trivittatus*, Coq., *atropalpus*, Coq., and *sollicitans*, Walker.

A complete table of species is given below:—

a. Legs basally pale banded.
 β. Abdomen basally pale banded.
 γ. Ungues all uniserrate.
 Thorax golden brown with two lateral pale lines most pronounced behind *abfitchii.* Felt.*
 Thorax golden yellow and golden brown scales, with traces of spots and lines *cantans.* Meigen.
 Thorax with median dark line, no pale scaled area in front of mesonotum *subcantans.* Felt.
 Thorax with broad submedian rich brown vittae bordered laterally with a broad pale creamy or silvery line and a median dark line..... *fitchii.* Felt.
 Thorax black with pale golden to creamy scales, unadorned..... *waterhousei.* Theobald.
 γγ. Hind ungues simple.
 Thorax with reddish brown scales unadorned *cantator.* Coquillett.
 Thorax black with pale golden to creamy scales *nipponii.* n. sp.

* *C. siphonalis*, Grossbeck, is said to be the same as this species.

Thorax tessellated with gold and brown scales, very small *minuta.* n. sp.

ββ. Abdomen yellow scaled *arcanus.* Blanchard.

αα. Legs with apical banding.

Ungues all uniserrate *onondagensis.* Felt.

ααα. Legs with basal and apical banding.

Abdomen unbanded *fluviatilis.* n. sp.

Abdomen with basal pale bands..... *canadensis.* Theobald.

αααα. Legs unbanded.

δ. Yellowish species.

Abdomen all yellow.

Fork-cells short normal..... *lutescens.* Fabricius.

Fork-cells rather long *quasimodesta.* Theobald.

Abdomen with dark apical bands; smaller than above..... *bicolor.* Meigen.

δδ. Not yellow.

ζ. Abdomen unbanded.

ε. Hind ungues simple.

Thorax golden scaled with two median dark bare lines *bupengaryensis.* Theobald.

ζζ. Abdomen with basal pale bands.

Ungues all uniserrate.

Thorax brown with golden scaled line on each side and traces of two golden scaled lines behind... *aurifer.* Coquillett.

Thorax with a broad rich brown median stripe and a long similar coloured patch on each side behind from the mid of mesonotum—a narrow pale line between them and the mid area ... *pretans.* Grossbeck.

Thorax with silvery grey scales at the sides, golden brown in the middle *trichura.* Dyar.

Thorax golden scaled with two median dark bare lines *diversa.* Theobald.

Thorax golden yellow scaled with two broad brown sub-median lines and a narrow median one *lazarensis.* Felt and Young.

Thorax golden yellow scaled with a narrow median dark line and a broader brownish one on each side..... *abserrata.* Felt.

Thorax brownish grey, a brown spot at middle becoming wider behind, the sides separated by a narrow white line *cinereoborealis.* Felt.

Thorax dark with golden brown and golden scales, those at the sides paler and brighter than in middle and forming two more or less pale narrow lines *nemorosa.* Meigen.

CULICADA FITCHII. Felt and Young (1904).

Culex fitchii. Felt and Young.

Mosq. N. Y. St. Bull. 79, Ent. 22, N. Y. St. Mus., p. 281 (1904); 20th Rept. St. Ent. N. Y. St. Mus. Bull., 97, Ent. 24, p. 451 (1905).

Closely related to *abfitchii*, but the mesonotum has broad sub-median rich brown vittae bordered laterally by a broad area of pale creamy almost silvery scales and a median thin dark line. No bare median head line as in *abfitchii*.

♀. Head deep brown, with narrow-curved scales in the middle becoming browner, then small flat scales which are almost

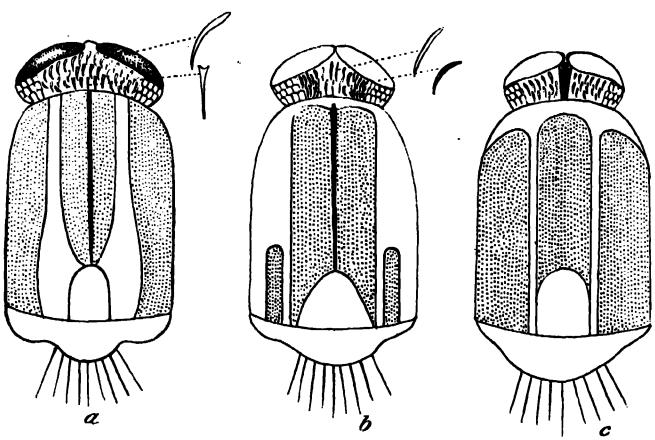


Fig. 111.
Cephalic and thoracic adornment of a, *Culicada subcantans*, Felt; b, *C. fitchii*, Felt; c, *C. abfitchii*, Felt.

white with two patches of dark ones; forked scales pale creamy to white in the middle, black behind and at the sides.

Palpi almost black with some white scales, both at apex and on the basal area. Proboscis dark brown (Felt says "rather thickly flecked almost its entire length with silvery-white scales"). Antennae brown, basal segment testaceous with a patch of small

flat creamy white scales on the inner surface, the verticillate hairs brown, the internodal pubescence pale.

Thorax rich brown with a narrow dark median line and traces of sub-median dark lines, the middle area of thorax clothed with narrow-curved bright rich golden brown scales, the sides with pale creamy scales, the pale scaled areas narrowing posteriorly but sending a narrow line of pale scales towards the scutellum, many pale scales around the bare space in front of the scutellum; scutellum pale brown with narrow-curved pale scales and pale golden border-bristles; pleurae brown with patches of flat white scales; metanotum bright brown.

Abdomen dark brown, with distinct pale creamy basal bands which vary in form, some are prolonged medianally, in others laterally, the bands on the sixth and seventh segments occupy half and three-fourths respectively of the segments on the dorsum; apical segment may be all pale scaled; venter mostly pale scaled but with a median dark line which is much broken, and a dusky patch at the posterior corners of each segment.

Legs with the femora and tibiae with black and creamy scattered scales, the former pale at the base, both segments with many pale scales ventrally. The femora have many more pale scales than the tibiae, the fore, mid, and hind first tarsals with basal white bands, the next three tarsals of the fore and mid and all the hind tarsals with basal white bands, most prominent in the hind legs; ungues all equal and uniserrate.

Wings with brown scales with scattered creamy ones; first sub-marginal cell longer and narrower than the second posterior



Fig. 112.
Grabhamia fitchii. Felt. ♀.

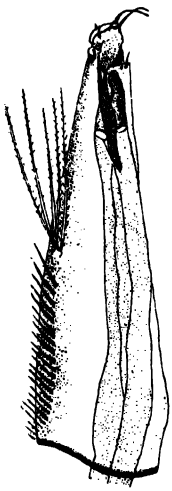
cell, its stem about two-thirds the length of the cell, its base about level with that of the second posterior cell.

Posterior cross-vein a little less than its own length distant from the mid cross-vein.

Halteres with fuscous apex and pale stem.

Length.—6 to 7 mm.

♂. "Palpi dark brown, the third segment capitate, and with a broad basal and a median white band, a lateral whitish patch of scales apically, with a rather sparse ventral tuft and with two short, stout, sub-apical setae; this segment one-third longer than the combined nearly equal fourth and fifth segments, the fourth with a broad, well-defined, white basal band; the fifth with a rudimentary basal band of the same colour, more slender than the fourth and extending its own length beyond the pro-



Culicada fitchii.
Air tube. (Felt.)

Fig. 113.



C. fitchii.
Pecten tooth.



Fig. 114.
Comb scale of *C. fitchii.* (Felt.)

boscis." . . . "Abdomen dark brown, with distinct rather broad basal yellowish white bands slightly produced laterally, those on the fifth and sixth segments covering the anterior half, and that on the seventh most of the segment, the eighth sparsely clothed with silvery white scales. . . . Claws of anterior and middle legs unequal (the shorter simple), the larger claw of middle leg being nearly straight" (Felt).

Habitat.—New York State (Professor E. P. Felt).

Time of appearance.—Middle to latter part of May.

Observations.—I have redescribed this species (♀) from a specimen lent me by the Smithsonian Institute, and have added notes on the ♂ from Professor Felt's original description.

The adult roughly resembles both *abfitchii* and *subcantans*, but can at once be told by the rich brown sub-median vittae bordered laterally by a broad area clothed with loose curved silvery scales, as described by Felt. Abraded specimens resemble *abfitchii*, *subcantans*, *cantans*, and *sylvestris*.

Habits of larvae.—Professor Felt states that the larvae occur in association with a number of early spring forms. They may be recognised by the long, uniformly tapering air tube with continuous, closely-placed row of jet-black pecten at its base. They are apparently confined very largely to open, grassy pools such as are found along roadsides and in meadows where it is found in association with *subcantans*, *abfitchii*, *trichurus*, *impiger*, *Aedes fuscus*, etc.

CULICADA SUBCANTANS. Felt (1905).

Culex cantans. Felt (non Meigen).

Mosq. N. Y. State, Bull. 79, Ent. 22, N. Y. St. Mus., pp. 284–289 (1904), Felt (*cantans*); Rept. N. J. St. Agri. Exp. St. Mosq., p. 240 (1904), Smith; 20th Rept. St. Ento.; N. Y. St. Mus. Bull. 97, Ent. 24, p. 474 (1905), Felt.

Allied to *C. abfitchii*, but with longer narrow-curved head scales and no median bare line; scutellum smaller; a distinct dark median thoracic line; no pale scaled area in front of mesonotum, and the posterior cross-vein nearer the mid. Harpes shorter, not more than half length of basal lobe.

♀. Head deep brown with large long narrow-curved pale creamy scales and black upright forked scales, some flat black and then pale creamy lateral ones; chaetae brown, except those between the eyes, which are pale creamy. Palpi deep brown. Antennae brown, base testaceous. Proboscis deep brown, scattered pale scales at the base.

Thorax brown, with dark longitudinal lines, clothed with golden brown narrow-curved scales, two lines of pale creamy ones, which behind unite with a pale scaled area in front of the scutellum, the pale scales also occur in front of the mesonotum; a median bare dark line is also prominent; scutellum brown, with narrow-curved pale scales; nine or ten bristles on posterior border of mid lobe; metanotum bright brown; pleurae brown with flat creamy scales.

Abdomen deep brown, with basal creamy bands and pale lateral spots and very narrow apical pale bands; posterior border-bristles pallid.

Legs with femora and tibiae brown with scattered whitish scales, femora pale at base and beneath; first tarsals unbanded; second and third fore and mid tarsals with narrow basal pale bands: banding on hind legs more pronounced; ungues equal and uniserrate.

Wings with brown scales and some scattered pale ones; first sub-marginal cell longer and narrower than the second posterior cell, its stem nearly two-thirds the length of the cell, its base about level with that of the second posterior cell, stem of the latter nearly as long as the cell; posterior cross-vein a little more than its own length distant from the mid.

Length.—6–8 mm.

♂. "Basal clasp segment stout; clasper slender, slightly swollen near the middle, and with a long slender apical spine. Claspette a slight basal lobe bearing a very long curved chitinous spine and a few large setae. Harpes with the proximal portion stout, and at the basal third several large internal spines; distal parts on a very long, slender, halbert-like blade, with a slightly recurved acute tip. Harpogones evenly rounded, terminating in a stout recurved tooth and with several smaller teeth. Unci approximate, rather broad, apex acute. Setaceous lobes well developed, with numerous large chitinous spines" (Felt).

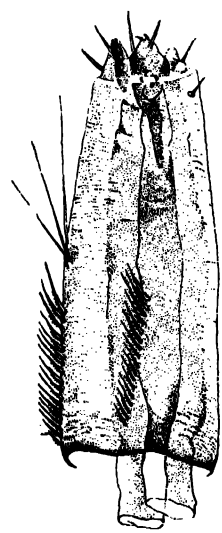


Fig. 115.
Siphon of *Culicada subcantans* (after Felt).

Fore and mid ungues unequal uniserrate, hind equal and uniserrate.

Habitat.—New England and New York (E. P. Felt and L. O. Howard), Saskatchewan River, Colorado, Arizona, New Mexico, and Mexico, New Jersey.

Time of appearance.—May and June.

Observations.—This species was at first taken by Felt to be Meigen's *C. cantans;* it can at once be told, however, by the thoracic adornment and abdomen and ♂ genitalia as pointed out by Felt. Concerning this Felt writes, "The above named (*cantans*) American species noticed by Dr. Smith and the writer under the name of *Culex cantans*, Meigen, is a different species. There is considerable similarity between the genitalia of our American species and the European

form, yet they are readily separated by the conspicuous linear, oblique, setaceous lobe at the base of the first clasp segment, and in particular by the conspicuous prolongation of the inner ventral wall into a tapering process with rounded extremity, which nearly meets the one arising on the opposite segment. The narrow setaceous lobe has a peculiar curved spine at its lateral extremity, and its posterior margin is thickly clothed with stiff setae. Ventral surface of the conspicuous basal lobe also thickly clothed with setae, and its apex bears a thick brush which intermingles with that arising from the process on the opposite side."

The *larva* has been described by E. P. Felt and J. B. Smith.

Its head is dark brown ; antennae pale brown, darker at tip and with scanty tuft arising before the middle of the joint. Labial plate triangular and toothed as shown in Felt's figure

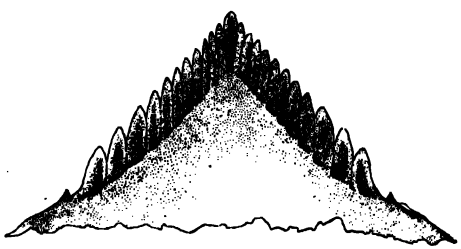


Fig. 116.
Labial plate of *C. subcantans* (after Felt).

reproduced here. Anal segment with broad dorsal plate, extending nearly to the ventral line but not enclosing the segment. Siphon nearly cylindrical, tapering slightly and with double row of pecten, each terminated by a branched hair, pecten with three prominent and several smaller serrations. Comb consists of a somewhat irregular patch of scales arranged in about three rows, each scale being somewhat spatulate and tipped with numerous fine hairs and a terminal coarser spine. Number of comb scales varies from twenty-eight to thirty-two according to Felt. There is evidently some confusion in regard to this larva, for Dyar, Smith and Felt's figures do not agree.

The figures reproduced here are Felt's, as they agree in every way with the specimens he sent me of adults and larvae.

Habits and life-history.—According to Dr. Dyar it flies most of the summer, but occurs as one generation only. Professor Felt says the larvae survive the winter, but Dr. Dyar states that

they hatch from over-wintering eggs very early in the spring and that the growth is not rapid, a month probably being required

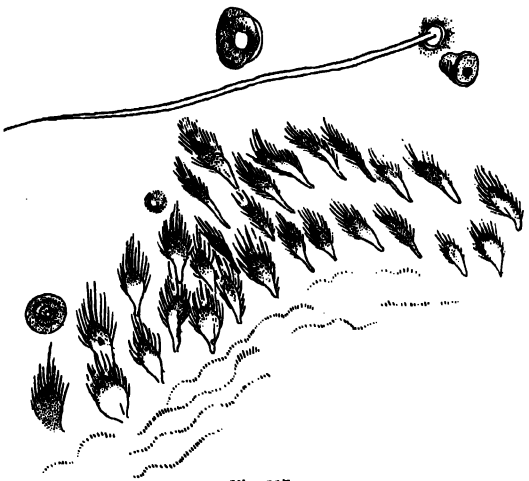


Fig. 117.

Comb of larva of *Culicada subcantans* (after Felt).

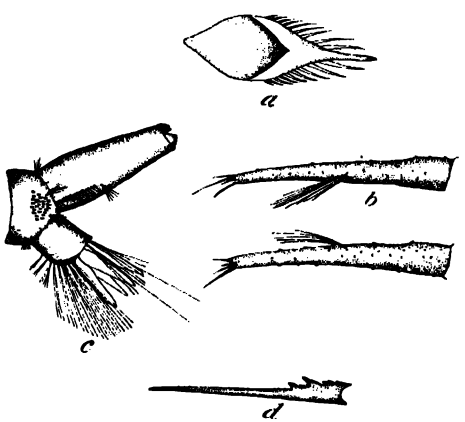


Fig. 118.

Culicada subcantans. Felt.

a, Scale of 8th segment; b, antennae; c, siphon, etc.; d, scale of pecten (after Smith).

for the hatching of the adults. The eggs are said to be laid singly, and readily sink in the water.

The larvae occur in woodland pools and springs in early spring, according to Professor J. B. Smith, in company with those of *C. canadensis.*

Smith states (p. 243) that the larvae favour the deeper pools, and feed and hide amongst dead leaves on the bottom, but the pupae are always at the surface.

Culicada abfitchii. Felt (1905).

Culex abfitchii. Felt (nom. nud.) (1904).

Culex siphonalis. Grossbeck (?).

20th Rept. St. Ent. Bull. 97, Ent. 24, N. Y. St. Mus. (1905); Mosquitoes of N. Y. St. Bull. 79, Ent. 22, N. Y. St. Mus., p. 381 (1904) (*nom. nud.*).

Head pale golden yellow with black and a few pale upright forked scales; proboscis dark with scattered pale scales. Thorax densely clothed with golden brown scales, with two lateral pale lines most pronounced behind. Abdomen deep brown with basal pale bands, which may expand laterally or medianally. Wings with mottled scales. Legs brown with scattered pale scales and basal white bands.

♀. Head brown clothed with narrow-curved pale golden yellow to creamy scales, flat pale golden, then black lateral ones, black upright forked scales with a few pale ones in front; the curved scales of the mid area and back of the occiput broader and paler than the others, the former pass well between the eyes, and a few pale golden bristles also project forwards, brown ones on the rest of the head; proboscis and palpi blackish brown with scattered pale scales; antennae brown, basal segment bright testaceous with a few small flat creamy and black scales, the latter also occur on the second segment.

Thorax deep brown clothed with rich golden brown narrow-curved scales, a sub-median line on each side of pale creamy scales most marked on the posterior half and forming a mass in front of the scutellum, these pale scales are also prominent at the sides of the thorax and thickly clothe the scutellum; chaetae golden and brown, the former notably over the roots of the wings; pleurae ochreous to pale brown with dense flat white scales; metanotum bright pale brown.

Abdomen deep brown with pale creamy to white basal bands which spread out laterally, often extending all along the sides of the segments, penultimate segment with pale apical scales, apical

one with pale scales all over it; basal segment pale with flat white scales only; hairs pale golden; venter mostly pale-scaled.

Legs with the femora pale ochreous and yellow with a speckling of dark scales, apex white; tibiae the same but rather more dark scales; first tarsals with still more dark scales, especially apically; other tarsals deep brown, the three following on all the legs with basal white bands most pronounced on the hind legs. Ungues all equal and uniserrate, black.

Wings with brown scales and some scattered creamy ones, especially basally; the first sub-marginal cell longer and narrower than the second posterior cell, which is broad; stem of the



Fig. 119.
Wing of *Culicada abfitchii*. ♀. Felt.

former half the length of the cell, of the latter as long as the cell; posterior cross-vein sloping backwards, about its own length distant from the mid.

Length.—6 mm.

♂. Palpi yellowish brown with three pale bands, hair-tufts flaxen brown, most pronounced at apex of the antepenultimate segment.

Thorax and abdomen as in ♀. Antennae with flaxen brown plume-hairs.

Wings with the first sub-marginal cell very small, much narrower and very little longer than the wide second posterior, stems of both fork-cells about as long as the cells; posterior cross-vein longer than the mid about its own length distant from it. Ungues of fore and mid legs unequal, uniserrate; hind ones equal and simple. Genitalia with large basal lobes; claspers a little more than half their length, with long thin terminal segment; harpes long, enlarged near apex which is acuminate.

Length.—8 mm.

Habitat.—Karner, N. York (E. P. Felt).

Time of hatching.—May.

Larva.—Very like that of *C. subcantans*, Felt, but may be told by the longer tapering air tubes and the smaller number of slender comb scales, and from *C. fitchii* by its stouter air tube and particularly by the two isolated, well separate teeth terminating the pecten. The comb scales also differ slightly.

Life-history.—Apparently winters in the egg stage, the ova hatching out in the early spring. One generation only, the species not being met with after the end of May. The larvae are confined mainly to grassy pools, sheltering under overhanging grasses (Felt).

Observations.—Redescribed from material sent me by Prof. E. P. Felt. It comes very near *cantans* and *subcantans*, but the thoracic adornment differs. Grossbeck's *C. siphonalis* is said to be this species.

CULICADA SIPHONALIS. Grossbeck (1905).

Culex siphonalis. Grossbeck (1905).

Canad. Ento. XXXVIII., p. 332 (1906); Mosq. N. Jersey, p. 243, Smith (1905) (= *Culicada abfitchii.* Felt (?)).

Head with pale yellow scales; thorax covered with mixed pale yellow and brown scales at sides, with a median brown-scaled stripe and pale scales forming a narrow border to it; legs basally banded; abdomen dusky brown with pale yellowish basal bands and very narrow apical ones on the posterior three segments, merging into brown.

"♀. Head brown; occiput covered with pale yellow scales extending forward between the eyes; palpi dark brown, four-jointed, apical segment small and rounded; proboscis pale brown with dark brown scales scattered over the surface, apex darker than rest; antennae brown, testaceous at base.

Thorax covered with a mixture of pale yellow and brown scales at the sides, and with a median stripe composed wholly of brown scales, the pale scales of the sides sometimes forming a narrow border to this brown stripe; pleura brown, with patches of dull white scales. Femora yellowish beneath and at extreme apex on upper side, remainder covered with mixed black and white scales; tibiae and second tarsal segments blackish brown, sprinkled with whitish scales, all other tarsal segments black. Fore and mid tarsals narrowly ringed with white at the

base of the segments except the fifth one on the anterior feet; posterior tarsals with broad basal bands of pure white.

Ungues all uniserrated.

Abdomen blackish-brown with pale yellowish bands at the base of the segments and extremely narrow apical ones at the

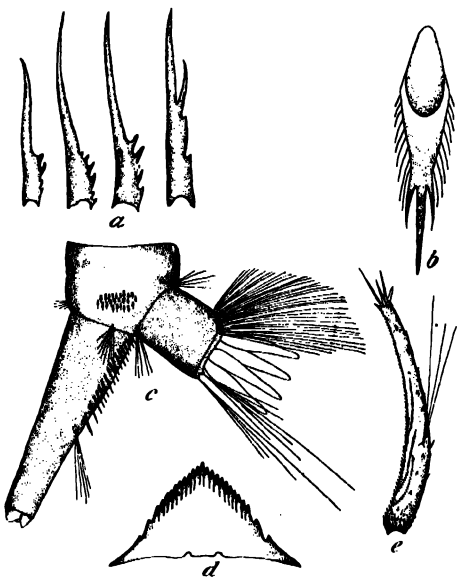


Fig. 120.

Culex siphonalis. (Grossbeck.

a, Spines of siphon; b, spine of 8th segment; c, siphon and anal segment; d, labial plate; e, antenna (Smith).

base of the posterior three segments, irregularly merging into the brown, becoming diffused at the sides until, beneath, the scales are mixed together indiscriminately, the white ones predominating.

♂. Palpi brownish, with a pale band in the centre of the basal segment and at the two terminal ones, fan-like tufts dense, silky brown in colour. The claws of anterior tarsal joint are very stout, unequal in size, and each with a large median tooth; those of the mid tarsal joint are unequal, the larger long and slender with a long blunt tooth one-third its length from the base, the smaller with a median tooth near the base; posterior claws equal, each with a median tooth near base.

Length.—5 to 6 mm.

Habitat.—Livingston Park, New Jersey, U.S.A. (Van Dursen).

Time of appearance.—May."

Observations.—The description is taken from Smith (p. 244), as this species has not been received. It is said to closely resemble *Culicada cantans*, but is smaller, darker in colour, and with a brown line in the centre of the mesothorax, and the abdominal bands are greyer and more diffuse. It seems to me to approach more closely *C. abfitchii*, Felt. It is a wood mosquito and is an early species. The adults have not been caught, all have been reared. The larva differs from *C. cantans* in antennal structure, and in the form and armature of the siphon. It is 9 to 11 mm. long, light grey to yellowish brown with somewhat darker thorax; the antennae are curved, with a few short thorn-like spines and three or four regular rows of minute spines running from the base towards the apex; lateral tuft well below the middle and consists of three or four long hairs; three irregular lengthed apical spines and an articulated process. There are 24–30 scales on comb of eighth segment, the apex long with three thick spines, and fine ones along the sides; spines of pecten of siphon 15–22 in each row of varied form. The larvae occurred in swampy woodland with *C. canadensis* and a *Corethra*.

They occur only in deep pools, and hide amongst leaves at the bottom of them, and amongst which they feed.

Pupation began on May 7th; the pupal period lasting from four to five days. The winter is probably passed in the egg stage (Smith, p. 248).

It is now said that this is only Felt's *C. abfitchii*. It certainly reads very much like that species.

CULICADA WATERHOUSEI. Theobald (1905).

Culex waterhousei. Theobald.

Ann. Mag. Nat. Hist. Ser. 7, XVI., p. 674, Dec. (1905).

Thorax black, clothed with pale golden to creamy scales. Abdomen deep brown, with pale basal bands. Palpi of male brown, with yellowish mottling in places, two basal white bands to the two apical segments, and two yellow bands towards the base. Legs deep brown, femora and tibiae mottled with yellow; first, second and third tarsals of fore and mid legs with narrow basal white bands; in the hind legs the white bands are broader.

Apical segment of ♂ claspers with spines; median processes broadly expanded apically. Fore and mid ungues unequal, hind equal, *all* uniserrated.

♂. Head deep brown, clothed with rather large, creamy, curved scales, long, narrow ochreous upright forked scales in front, with rather broader and shorter ones behind, and flat, creamy lateral scales. Palpi, with the two long apical segments nearly the same length, deep brown, with an irregular white scaled basal area to each, and with blackish hair-tufts; the long

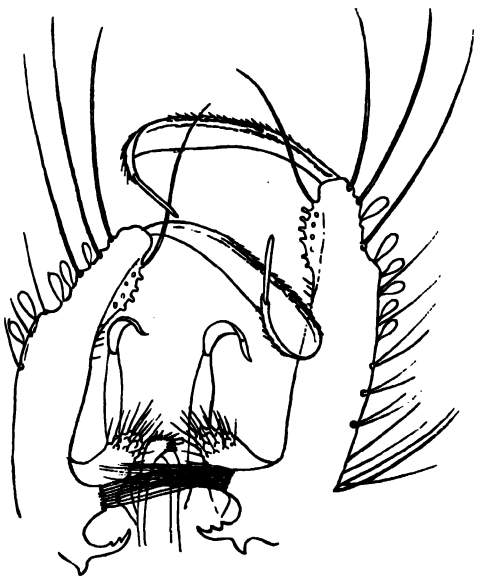


Fig. 121.
Male genitalia of *Culicada waterhousei*. Theobald.

antepenultimate segments with two broad, creamy scaled bands, the two apical segments with black hair-tufts, and also black hairs on the apex of the antepenultimate. Antennae with very deep brown plume-hairs. Proboscis deep brown, unbanded.

Thorax black, with rather large, curved, pale golden scales somewhat paler over the roots of the wings; scutellum testaceous, deep brown along the border of the mid lobe, and with a deep brown patch on each side between the mid and side lobes, clothed with rather large, narrow-curved scales of similar hue to those of the mesothorax; posterior border-bristles dense, pale

golden; pleurae deep brown, with pale creamy flat scales; metanotum brown.

Abdomen blackish, with basal creamy bands and pale brown to dull golden hairs; basal segment with many pale scales.

Legs with the femora and tibiae mottled brown and yellow, fore and mid first tarsals with narrow basal white bands, also the next two tarsals; in the hind legs the bands are broader and are present on all the segments; fore and mid ungues large, unequal, both uniserrated, the hind equal and uniserrated.

Wings with rather broad lateral vein-scales, especially on the branches of the second long vein; many scales on the first long vein *Taeniorhynchus*-like. First sub-marginal cell considerably longer and narrower than the second posterior cell, their bases nearly level; stem of the first sub-marginal cell nearly as long as the cell; stem of the second posterior longer than the cell; mid cross-vein longer than either the supernumerary or posterior cross-veins, the latter about its own length distant from the mid cross-vein.

Male genitalia with the claspers long and broad, spiny towards the apex, apical segment short and thick; one side of the apex of the basal lobes armed with short hook-like spines; a large, pineapple-shaped, densely tuberculate process from the base of each side; the harpogones long, composed of two segments, the apical one broadly knife-shaped and curved on its inner edge.

Length.—5·5 mm.

Habitat.—New Forest, Brockenhurst (C. O. Waterhouse).

Observations.—Described from a single ♂, easily told from all other banded legged *Culicada* by the strange male genitalia and the posterior uniserrate ungues.

Mr. Waterhouse has found the larvae in March, so that probably the eggs are laid in mud around the pools and hatch out in the spring.*

CULICADA CANTATOR. Coquillett (1903).

Culex cantator. Coquillett.

Canad. Entomo., p. 255, Sept. (1903); Mosq. New Jersey, pp. 231 to 239, Smith (1905).

This is a very distinct species that comes in Felt's genus *Culicada*. It is not in the least connected or near *Culex sylvestris*, Theob., as the describer says; he separates it from *Culex sylvestris*,

* Since this went to press some ♀'s have been received.

Theob., in a totally different *group* by the "seventh abdominal segment (being) almost wholly yellow scaled, etc." This mere colour variation I have even seen in *sylvestris*. It comes very near *C. cantans*, Meigen, but the narrow leg banding and ungues separate it at once. The description drawn up here is taken from specimens named and bred by Felt and Smith.

♀. Head with pale creamy narrow-curved scales, golden-brown in front, flat pale lateral scales and very narrow upright brown forked scales; palpi, antennae and proboscis deep brown.

Thorax deep brown with very small rich reddish-brown narrow-

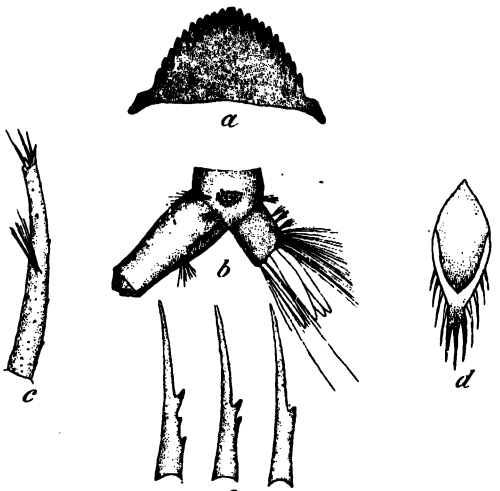


Fig. 122.

Culicada cantator. Coquillett.

a, labial plate of larva; b, terminal segments and siphon; c, antenna; d, scale from 8th segment; e, siphon spines (after Smith).

curved scales, becoming paler around the bare space in front of the scutellum and on the latter.

Abdomen deep brown with basal dull yellowish bands which spread out laterally and also pass as a narrow band into the apex of the preceding segment; basal segment pale scaled; border-bristles dull golden.

Legs mottled brown and yellow, with narrow basal pale bands, which are scarcely apparent on the last tarsals; fore and mid ungues uniserrate, hind simple.

♂. In the ♂ the palpi brownish-black, with *traces* of pale bands, and brown hair-tufts.

Ungues of fore and mid legs are uniserrate, of the hind simple.

Length.—♀, 7 mm.; ♂, 6·5 to 7 mm.

Habitat.—Boston Harbour, Massachusetts; Fort McHenry, Maryland; Maine; New York Harbour; Fort Harrison, Montana; New Jersey (Mr. Coquillett, Miss Ludlow, Prof. J. B. Smith, and Prof. E. P. Felt); Connecticut (H. L. Viereck).

Observations on habits and life-history, etc.—The habits of the adult and larval characters are mainly taken from the writings of Prof. J. B. Smith and Prof. E. P. Felt, who have so kindly helped me with specimens.

This distinct species was not recognised by American observers until 1903, but seems to have been confused with *Culiçada cantans*, Meigen, and *Culex sylvestris*, Theobald.

Smith showed that it was a distinct species, and then Coquillett described it.

Smith observed larvae as early as March 23rd, and adults began to issue in the early days of April, but it was not until the end of the month and early May that the bulk appeared and migration was in full force.

Both sexes fly together for some distance. The ♂'s are seen for a day or two only, but they arrive with the ♀'s, and can stand a flight of several miles. They seem in New Jersey to be mainly marsh and littoral breeders.

They enter houses freely when kept open, and are attracted by light and the human odour. They are most persistent biters. The bite is more lasting in effects than that of *G. sollicitans*. Although essentially an evening mosquito, it will bite readily during the day when opportunity offers, like the European and American *C. cantans* of Meigen.

The *larva* varies from 7–9 mm. in length, and is yellowish grey in colour when mature, almost white when young; the head being paler than the rest of the body, spotting on head very distinctive; antennae short, with a single, very perceptible curve, dark brown, paler at the base, sparsely set with short stout spines, a lateral tuft of 8 to 10 hairs a little below the middle; at the apex a long and short spine, two bristles and a very small segment; labial plate with 9–10 teeth on each side of the apex. Scales on eighth segment 30–40, of form shown in figure; pecten of siphon with barbed spines, 16 to 22 in each row; anal gills vary in length, being short to long, usually the latter.

The eggs are laid just as in *sollicitans*, but they are larger. Larvae occur in both salt and fresh water, but the latter is preferred.

CULICADA NIPPONII. n. sp.

Head and thorax deep brown, clothed with golden scales, proboscis with scattered golden scales, with black apex, palpi mottled. Abdomen deep brown with basal pale bands forming lateral patches on the fourth to sixth segments, the latter with apical yellow scales and most of the segments with median grey scales, scarcely, however, forming a median line.

Legs deep brown with narrow basal pale bands. Wings with yellowish brown scales.

♀. Head deep brown with narrow-curved pale golden scales and very thin pale brown upright forked scales, not much expanded apically, lateral spatulate scales creamy white; golden chaetae between the eyes; black on remainder of head; palpi testaceous with brown scales, densest near the apex, which has white scales; antennae deep brown, basal segment and base of the second segment bright orange brown, with some small pale scales; proboscis with golden and brown scales, the former most prevalent, except at the apex, where the proboscis is deep black.

Thorax deep brown, clothed evenly with small narrow-curved golden scales and with golden-brown and brown chaetae; scutellum with narrow-curved pale golden scales and golden-brown border-bristles; metanotum rich brown; pleurae slate and grey and brown with some pale scales.

Abdomen with the basal segment testaceous, with a median patch of creamy scales and rather short pale golden hairs; the second and third segments with basal uniform creamy bands; on the fourth, fifth and sixth the bands spread out laterally, forming marked lateral areas; the sixth and seventh have yellow apical scales, and the second to the fifth have median pale scales which form a broken median line; venter pale scaled.

Legs yellowish-brown, clothed with scattered brown and yellow scales on femora and tibiae, so that they appear mottled; the first and other tarsals darker brown, a narrow pale basal band to the second two fore and mid tarsals, to all the hind tarsals; there is a pale knee spot to all the legs; fore and mid ungues equal, large, both uniserrate, hind equal and simple.

Wings with brown scales, a few pale ones on the basal area in the costal region; fork-cells rather short, the first sub-marginal

cell longer and a little narrower than the second posterior, its base slightly nearer the base of the wing, its stem more than one-third the length of the cell, stem of the second posterior cell



Fig. 123.
Wing of *Culicada nipponii*. ♀. n. sp.

as long as the cell; posterior cross-vein about the same length as the mid, not quite its own length distant from it, sloping backwards.

Halteres ochreous.

Length.—6 mm.

Habitat.—Karnizana, Japan (Mr. Cornford).

Time of capture.—August 26th.

Observations.—Described from a perfect ♀. It is a very beautiful species with golden scaled head and thorax. The head scales do not seem quite so large as is usual in *Culicada*, but it approaches so closely in all other respects, and in general appearance that it undoubtedly belongs to it.

The abdominal markings are very characteristic in the type, but as there are traces of a few scattered pale scales on the dark areas it is possible that it is subject to some variation.

Culicada minuta. n. sp.

Head brown and golden brown; proboscis deep brown apically, paler basally. Thorax tessellated with rich golden and brown scales. Abdomen deep blackish brown with broad basal white bands. Legs brown with narrow basal yellowish bands. Wings with short fork-cells.

♀. Head brown with large creamy to pale golden curved scales, large dark upright forked scales and flat creamy lateral ones with a small dark patch near the eye border on each side. Palpi with deep blackish brown scales, a few white ones at the apex; proboscis deep brown at the apex, paler, almost ochreous

basally; antennae brown, the basal segments paler in colour, the second and third thick and short.

Thorax clothed with golden and golden brown scales, giving it a tessellated appearance; scales somewhat paler in front of the scutellum; chaetae dense and deep rich brown; scutellum paler than the mesonotum, with narrow-curved pale creamy scales and eight deep brown border-bristles to the mid lobe; metanotum brown.

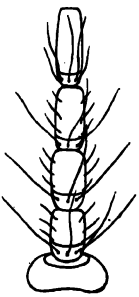


Fig. 124. *Culicada minuta*, n. sp. (Base of antenna.)

Abdomen deep brown, the second to sixth segments with broad basal white bands, the sixth with a band of yellow scales apically, and the seventh with many yellow scales over its surface; basal segment with two patches of white scales; border-bristles pale golden; genital lobes deep black; venter mainly white scaled.

Legs brown with ochreous reflections; on the fore legs the tibiae have small apical and basal pale areas, and there are traces of pale tarsal banding; in the mid the tibiae, first and next two tarsals have narrow basal yellowish bands, and on the hind legs the banding occurs at all the joints, but is narrow; fore and mid ungues equal and uniserrate; hind equal and simple.

Wings with the fork-cells short, the first sub-marginal longer and narrower than the second posterior, their bases nearly level, stem of the former nearly as long as the cell, of the latter the same length as the cell; posterior cross-vein about one and one-fourth its own length distant from the mid; lateral vein-scales long and thin.

Halteres pale ochreous brown.

Length.—4 mm.

Habitat.—India (Dr. Christophers).

Observations.—Described from a perfect ♀. It at first sight looks like a small *Grabhamia*, but an examination of the wings at once disproves that. It can be told from all other *Culicines* by the abdominal ornamentation, taken in conjunction with the adornment of the thorax.

The antennae present a rather peculiar structure, the two first segments of the flagellum being very short and thick, and the lateral vein scales are somewhat longer and narrower than in the typical *Culicada*, but it approaches that genus so closely I have not excluded it.

CULICADA ONONDAGENSIS. Felt (1904).

Culex onondagensis. Felt.

Bull. 79, Ent. 22, N. York St. Mus., p. 304, Pl. V., fig. 2, and Pl. 17, fig. 3 (1904), Felt.

Head with yellowish and silvery scales. Thorax with golden yellow scales, grey posteriorly. Abdomen dark brown with broad median and lateral stripes of silvery grey, basal pale bands, apex mostly silvery white. Legs with speckled femora and tibiae, legs with apical banding, fifth of hind pair white. Wings with mottled scales.

The following is Felt's original description :—

"Antennae dark brown, sparsely clothed with fine whitish hairs, with sparse basal whorls of dark brown hairs on the segments, basal one brown, clothed internally with yellowish scales. Palpi short, dark brown, with a few silvery white scales towards the apex. Apical portion of proboscis dark brown, basal part lighter with a few whitish scales. Occiput rather thickly clothed with yellowish and silvery scales, with a few black ones interspersed. Prothorax ornamented with a thick covering of golden yellowish scales, becoming greyish posteriorly. Scutellum similarly clothed and with no long setae. Halteres capitate, basal and apical portions fuscous. Pleura brownish, clothed with rather thick irregular patches of whitish scales. Abdomen dark brown, with a distinct broad median and somewhat broken lateral stripes of silvery grey scales slightly tinged with yellow. Basal bands of first and second abdominal segments somewhat indistinct, those of the third and fourth well marked, the dorsum of the remaining segments nearly covered with silvery white scales. Ventral surface sparsely covered with silvery grey and yellowish scales. Femora and tibiae mostly yellowish with somewhat brown scales, which are flecked where thick with white. Fore and mid tarsi brown with apical white rings, hind tarsi with the apex and the extremities of the segments distinctly ringed, except the distal of the fourth, fifth snow white. Claws unidentate. Wings hyaline, clothed with intermixed brown, straw yellow and colourless scales, the narrow long ones mostly transparent. Petioles of the first and second fork-cells about three-fourths the length of their respective cells.

"*Habitat.*—Lake Onondaga, Syracuse, U.S.A.

"*Time of capture.*—September (19th)."

Observations.—This is evidently a very distinct species which Felt now places in his genus *Culicada.*

CULICADA CANADENSIS. Theobald (1901).

Culex canadensis. Theobald (1901).

Mono. Culicid. II., p. 3 (1901), Theobald; Bull. 79, Ent. 22, p. 303, N. Y. St. Mus. (1904), Felt; Mosq. N. Jersey, p. 265 (1904), Smith.

Numerous notes have been made on this species by American observers.

Additional localities.—Albany and Poughkeepsie, New York State (E. P. Felt); New Jersey (J. B. Smith); Canton Harbour, New Hampshire and British Columbia (Dr. Dyar); Fort Logan, Arkansas; Fort Snelling, Minnesota; Fort McKinley, Montana; Westlawn, Cem. Okla (Miss Ludlow); Connecticut (H. L. Viereck).

Larva of Culex canadensis. Theob.

Length 7–8 mm.; dirty slate colour, head black. Up to time when two-thirds grown there is usually a pale band or neck giving a very characteristic appearance. Antenna slender, short, pale brown, with short stout spines and with more numerous very small ones; lateral tuft of 6 to 10 hairs situated well below middle; apex with a long and short spine, two bristles and a small joint; mentum triangular with 12 to 14 teeth on each side of apex. Comb of eighth segment of 25 to 50 elongated fringed scales, 40 being the average arranged as shown in Smith's figure. Pecten of siphon with two series of toothed spines ranging from 16 to 24, 18 being the average; anal gills moderately long.

Observations.—Culex canadensis is the earliest and latest of the species that winter in the egg stage, earliest as both larvæ and adults, latest as to larvæ only. The latter do not seem to be affected by cold, for Professor J. B. Smith records their being found in February in pools covered with ice, and water temperature of 36° F. The same observer found the ova in bottom mud from various pools.

The adults appear in April and are found as late as September in New Jersey. Professor E. P. Felt says they appear in early May about Albany. The *eggs* are black, spindle-shaped and smooth. They may be laid on the water and then sink to the bottom, or they may be laid on mud.

Dyar states that the eggs are laid singly, non-adherent, fusiform, with ends rounded, black. According to Felt (p. 304) the larvæ seem to hibernate in New York State, for he found them of large size when they first appear in the spring.

The chief breeding places are woodland pools and larger bodies of water, especially in clean water. The larvæ have been

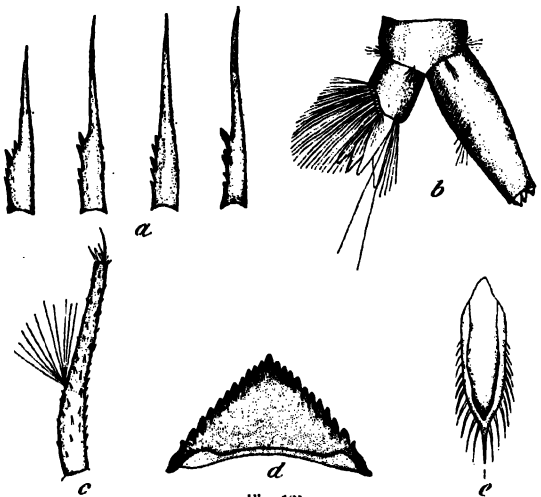


Fig. 125.

Culicada canadensis. Theobald.

ales of siphon comb ; b, siphon and anal segment ; c, antenna ; d, labial plate ; e, scale of comb of 8th segment (after Smith).

found associated with *cantans*, *aurifer*, *melanurus*, *territans*, *reptans*, *serratus*, *trivittatus*, *dupreei*, and *squamiger*.

It is essentially a wood mosquito and bites hard in its natural surroundings ; it rarely approaches houses unless built in a wood, and is very rare in towns and villages. It flies in early morning and at dusk. The males live only a few days, the females several weeks.

Culicada fluviatilis. Lutz (1904).

Culex fluviatilis. Lutz.

Mosq. do Brasil, p. 42, 72 and 77 (1904).

Head brown with median pale scaled line and pale border around the eyes and at the sides ; palpi and proboscis deep brown. Thorax deep brown in the middle with larger pale creamy scales at the sides ; pleurae with silvery puncta. Abdomen unbanded with basal silvery white patches. Legs brown, the anterior first and second tarsals basally white, the mid with

the bases and apex of the first and greater part of the second tarsals white; hind legs as in the mid; knee spot white.

♀. Head with rather broad narrow-curved scales, deep brown except for a median line of golden ones and pale ones around the eyes with flat white ones laterally; palpi and proboscis deep blackish brown; antennae brown, basal lobe with grey sheen on one side with black bristles; second segment with dense black scales.

Thorax deep shiny blackish brown with rich brown narrow-curved scales in the middle with broader creamy-curved scales at the sides, especially dense in front, with narrow-curved brown scales on the scutellum; pleurae deep brown with silvery puncta; metanotum black.

Abdomen deep blackish brown with golden border-bristles with basal silvery white lateral spots.

Anterior legs deep brown, a narrow white band at the base of the first and other tarsals; mid legs with base of femora and under side white, a broad creamy white band at base and apex of the first tarsal, and a very broad basal pale band to the second tarsal; hind legs with the femora white on basal half and with a white apex, banding similar to the mid legs but not so wide and whiter; fore and mid ungues equal and uniserrate, hind equal and simple.

Wings with dense brown vein scales, the first sub-marginal cell considerably longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem about one-



Fig. 126.
Wing of *Culicada fluviatilis*. ♀. Lutz.

fourth the length of the cell, stem of the broad second posterior cell about two-thirds the length of the cell; posterior cross-vein about one and a third times its own length distant from the mid.

Length.—4 to 5·5 mm.

Habitat.—São Paulo, Brazil (Dr. A. Lutz).

Time of capture.—April.

Observations.—Redescribed from specimens given me by Dr Lutz. It is a very marked species which undoubtedly comes in the genus *Culicada*, the broad curved head scales and the dense linear wing scales and palpi of the ♀ agree with Felt's type of this genus. It is a very marked species easily told by the broad band on the mid and hind legs involving both sides of the metatarsi and tarsi, broader on the mid than hind legs.

CULICADA LUTESCENS. Fabricius (1775).

Culex lutescens. Fabr. (1775).

Culex flavescens. Villers (1789) (non Theobald).

Culex flavescens. Fabr. (1805).

Systema entomo., etc., Flensburgi et Lipsiae (1775), et Ent. Syst. Hafniae (1792-94), Fabricius; Ex. Faun. Fridr. (1789), Villers; Syst. Antl. (1805) (= *flavescens*), Fabricius; Rev. Sist. Del. Culicidae Europee, p. 267 (1896), Ficalbi; Syst. Berch. Europ. Zweiflüg. Inst. I., p. 8 (1818), Meigen; Syst. Nat. V. 2888, 9, Gimmerthal; Ins. Brit. Dipt. III., 248 (1856), Walker; Faun. Austr. Die Fliegen I., Schiner; Ann. Mus. Nat. Hung. III., p. 91 (1905), Theobald.

Head clothed with pale yellowish scales, palpi and proboscis black. Thorax clothed with dull pale yellow scales, having a slightly reddish brown hue in the middle; in certain lights the scales on the mid line seem paler, then showing two dark (reddish brown) lines; pleurae pale scaled. Abdomen covered with pale yellowish scales. Legs with most of femora yellowish, remainder black.

♀. Head deep brown clothed with large pale creamy yellow narrow-curved scales in front and with dense yellow upright forked ones behind; palpi, clypeus and proboscis black; antennae deep brown, the basal and second segments with creamy scales, those on the basal segment forming a distinct pale spot.

Thorax deep brown, clothed with rather large pale yellow narrow-curved scales at the sides, front and behind, with thinner and more closely set reddish ones in the middle, the darker area having a median line of pale yellow scales, easily seen under the two-third power, but not otherwise, the thorax thus looks when held in certain lights as if it had two rather darker broad median areas. Scutellum deep brown with large narrow-curved pale yellow scales, border-bristles and also those on the mesothorax

golden-brown; metanotum deep brown; pleurae deep brown with flat creamy white scales, also the prothoracic lobes.

Abdomen deep brown clothed with flat yellow scales, a few dusky ones in the middle of each segment; basal segment with creamy white scales, apical segments paler than the preceding ones; border-bristles pale golden-yellow; venter densely clothed with pale creamy scales.

Legs unbanded, coxae brown with pale scales; femora yellowish, dark towards the apex, tip white; tibiae with scattered pale and dark scales above, pale yellow and white scales below; first tarsals black above, dull yellowish below; other tarsals black; ungues all equal, large, black and uniserrated.

Wings with the veins yellowish or brown according to the light; costa dark; base of wings yellowish; fork-cells short, first sub-marginal much narrower and a little longer than the second posterior cell, its base slightly nearer the apex of the wing, its stem nearly as long as the cell; stem of the second posterior as long as the cell; posterior cross-vein longer than the mid, not quite its own length distant from it.

Halteres yellowish, the knob darker and clothed with grey scales.

Length.—6 mm.

Time of capture.—April (29th).

Habitat.—Budapest, Hungary (Kertész).

Observations.—Redescribed from a perfect ♀. I see no reason to doubt that this is Fabricius' species—it answers to his short description and is the only European species I have seen that does so. *Culex bicolor*, Meigen, can at once be told from it by the *pipiens*-like venation and the simpler thorax and simple ungues.

Culex flavescens, Theobald, comes very near this insect but has banded tarsi.

Culicada quasimodesta. Theobald (1905).

Culex quasimodestus. Theobald (1905).

Ann. Mus. Nat. Hung. III., p. 88 (1905).

Head brown with golden narrow-curved scales; palpi brown; proboscis dull yellowish brown basally, deep brown apically. Thorax deep brown with dull golden-brown narrow-curved scales showing some ornamentation. Abdomen deep brown with

scattered ochreous scales, most dense on the apical segments. Legs deep brown, unbanded, deep ochreous at the base. Wings with the first sub-marginal cell considerably longer than the second posterior cell, its stem very short.

♀. Head deep brown, with narrow-curved golden scales and with thin upright deep brown forked scales. Palpi deep brown; proboscis deep brown at the apex with the basal half dull yellowish-brown to ochreous; antennae black, basal segment deep testaceous.

Thorax deep brown with narrow-curved deep golden-brown scales, with two oblong areas just in front of the roots of the wings darker than the rest, with very small narrow-curved scales, the scales in front of it somewhat paler than the rest, those in front of the scutellum also somewhat paler; scutellum testaceous with narrow-curved pale scales and deep brown border-bristles; metanotum bright brown; pleurae deep brown with some pale scaled areas.

Abdomen black with blackish-brown scales and with yellow scaled basal bands on the second to fifth segments, the following with scattered yellow scales all over them; venter black with scattered yellow scales all over it.

Legs uniformly deep brown with a pale spot, almost white at the junction of the femora and tibiae; the coxae deep testaceous; fore, mid and hind ungues equal and simple.

Wings with the first submarginal cell very much longer and slightly narrower than the second posterior cell, its stem nearly one-fifth the length of the cell; its base much nearer the base of the wing than that of the second posterior cell; stem of the second posterior cell rather more than half the length of the cell; posterior cross-vein about one and a half times its own length distant from the mid.

Halteres pale ochreous.

Length.—4·8 mm.

Habitat.—Sfax, Tunis (M. Biró).

Observations.—Described from a single ♀. It comes very near *Culex bicolor*, Meigen, but is smaller and the whole abdomen is not densely ochreous scaled. It also answers to Ficalbi's description of his *Culex modestus*, but does not agree with the specimens described as *modestus* by Kertész, and which also agree with Ficalbi's description. It differs from the latter in its darker thorax and basal yellow abdominal banding and ochreous scaled apex and also in the fork-cells. The first sub-marginal cell

being very long as in *C. bicolor*. It might even be a small variety of the latter.

CULICADA BICOLOR. Meigen (1818).

Culex bicolor. Meigen.

Syst. Beschr. I., p. 9 (1818), Meigen; Zool. Journ. I. (1825), Stephens; Syst. Cat. Brit. Ins. II., p. 232 (1829), Stephens; Mém. d. l. Soc. d'hist. nat. de Paris III., p. 409, 29 (1827), Rob.-Desvoidy; Bull. Soc. imp. d. nat. d. Moscou (1845), Gimmerthal; Fau. Aust. Die Fliegen, p. 627 (1864), Schiner; Ann. Mus. Nat. Hung. III., p. 90 (1905), Theobald; Les Moust., p. 372 (1905), Blanchard.

Head brown with narrow-curved pale golden-yellow scales, ochreous and black upright forked ones. Thorax brown with golden narrow-curved scales, with traces of darker longitudinal lines. Abdomen scaled with dull yellow scales all over. Femora and tibiae with dull yellowish reflections, tarsi dark brown.

♀. Head brown with scattered pale golden narrow-curved scales, with ochreous upright forked scales centrally, black towards the sides, lateral areas clothed with pale creamy flat scales; palpi brown clothed with dark and pale creamy scales, the latter predominating, bristles black; proboscis ochreous, darker towards the apex; antennae deep brown, basal segment testaceous, also the clypeus.

Thorax greyish-brown with darker longitudinal lines, clothed with narrow-curved pale golden scales and with dark brown bristles; scutellum pale testaceous with narrow-curved dull golden scales and brown border-bristles nine to the mid lobe; metanotum bright chestnut brown; pleurae yellowish with some pale scaled areas.

Abdomen black more or less completely clothed with dusky yellow scales, but on the fourth segment the scales are somewhat darker in two areas giving a bi-spotted appearance (not seen in all lights); posterior border-bristles and lateral hairs pale golden; venter similarly coloured.

Legs with the coxae, femora and tibiae of a dull ochreous hue, the tibiae darker (almost brown in some lights) than the two former, all the tarsals dark brown; ungues all equal and simple.

Wings with typical *Culex*-scales, the first sub-marginal much longer and slightly narrower than the second posterior cell, its base much the nearer to the base of the wing its stem about one

fourth the length of the cell; stem of the second posterior about half the length of the cell; supernumerary and mid-cross veins not closely united, the posterior nearly twice its own length distant from the mid; third vein and lower branch of the fifth vein darker scaled than the rest. Halteres pale ochreous.

Length.—6 mm. (specimen swollen with blood and contracted). Meigen gives 7–8 mm.

Habitat.—Sfax, Tunis (Biró); also recorded from Austria (Schiner); Russia (Gimmerthal); England (Stephens).

Observations.—Redescribed from a perfect female in the collection of the National Museum at Budapest. I do not think there is any doubt that this is Meigen's species in spite of his curt and obscure description, but all of his few characters agree, granted the mesothorax of his specimen was rubbed. I had not previously seen anything that would answer to this species, all specimens so named being only worn *Culex pipiens*, L.

CULICADA BUPENGARYENSIS. Theobald (1905).

Journ. Econ. Biol. Vol. I., No. 1, p. 27 (1905).

Head deep brown with dull golden scales, palpi and proboscis deep brown, basal segments of antennae bright ferruginous. Thorax deep brownish-black, clothed with bright golden scales, with two median parallel bare lines. Abdomen deep brown with violet reflections, unbanded, but with basal lateral creamy-white spots. Legs deep brown, unbanded, base and under side of femora pale reddish-brown. Wings with short fork-cells.

♀. Head deep brown, clothed with long narrow-curved pale golden scales and flat yellowish ones laterally, the upright forked scales ochreous; palpi and proboscis brown; clypeus bright brown, with a median sulcus and a blunt process on each side towards the base: the palpi are clothed with almost black scales and bristles, the apical segment minute, the penultimate long. Antennae brown, basal segments bright testaceous. Eyes black and silvery.

Thorax deep brownish-black, clothed with irregularly disposed golden narrow-curved scales except on two median parallel lines, which show as two dark lines on the golden-scaled mesonotum, and which are ornamented with narrow-curved bronzy-black scales, a few of these also occur over the roots of the wings; bristles partly black, partly golden. Scutellum ochreous brown, with pale golden narrow-curved scales, the mid lobe with deep

brown and golden border-bristles, the lateral with deep brown ones only; metanotum brown and testaceous; pleurae testaceous and brown, with flat creamy scales.

Abdomen deep brown in some lights, with violet reflections in others, the segments with basal lateral creamy patches, the

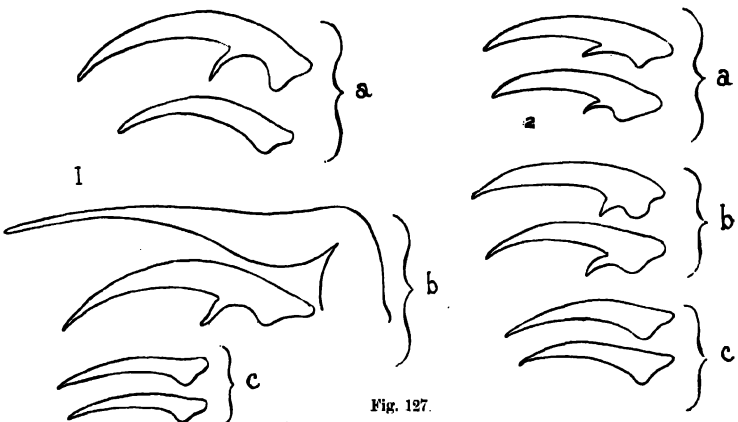


Fig. 127.
Culicada bupengaryensis. Theo.
1. Male; 2. Female ungues. a, b, and c, fore, mid and hind claws.

basal segment testaceous with two patches of dark scales; posterior border-bristles bright reddish-brown. Venter with yellowish basal bands.

Legs brown, with metallic violet and coppery hues, base and under side of femora ochreous; fore and mid ungues equal, uniserrated, thick, hind equal and simple, straighter than the others.

Wings with short fork-cells, first sub-marginal a little longer



Fig. 128.
Wing of *Culicada bupengaryensis.* ♀. Theobald.

and narrower than the second posterior, their bases nearly level, its stem not quite so long as the cell, stem of the second posterior

as long as the cell, posterior cross-vein about its own length distant from the mid, which is longer than the posterior; scales brown.

Halteres with pale stem, fuscous knob with creamy scales.

Length.—5·2 to 5·5 mm.

♂. Palpi deep brown, hair-tufts deep brown; antennae with deep brown plume-hairs. Head and thorax as in the female; pro-thoracic lobes prominent. Abdomen as in the female, but the basal parts of the segments are unscaled and testaceous, giving a broadly banded appearance. The first submarginal cell is only about half the width of the second posterior

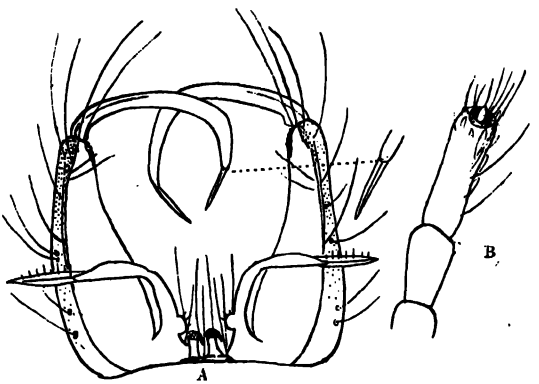


Fig. 129.
Culicada bupengaryensis. Theobald.
A, Male genitalia; B, female palp.

cell and about the same length, its stem the same length as the cell, whilst that of the second posterior is shorter.

Ungues of fore legs curved, unequal, the larger uniserrated, the smaller simple; in the mid more unequal than the fore, the smaller curved and uniserrated, the larger simple, bent close to the base, then nearly straight; hind pair equal, simple, small and nearly straight, acuminate. Male genitalia with prominent claspers.

Length.—5 to 5·5 mm.

Habitat.—Bupengary, South Queensland (Dr. Bancroft).

Time of capture.—November.

Observations.—Described from a series of males and females collected by Dr. Bancroft. No other known Australian species has a similar abdomen. It cannot be confused with any other

species. The male ungues are very marked. It clearly comes in Felt's new genus *Culicada*.

CULICADA AURIFER. Coquillett (1903).

Culiselsa aurifer. Coquillett.

Culex aurifer. Coquillett.

Canad. Entomo. XXXV., p. 255 (1903), Coquillett (*Culex aurifer*); Mosq. N. Jersey, p. 298 (1904), Smith; Bull. 79, Ent. 22, N. Y. St. Mus., p. 336 (1904), Felt (*Culiselsa aurifer*).

Head deep brown with golden scales, especially in the middle; proboscis deep brown unbanded. Thorax deep brown in the middle with a broad golden scaled line on each side and traces of two thin golden scaled lines on the brown area behind. Abdomen deep brown, yellow, with large basal lateral creamy spots which may spread out into bands. Legs deep brown unbanded.

♀. Head deep brown, clothed with narrow-curved brown scales except in the middle where they are golden-yellow, flat lateral scales golden, then black; golden bristles project between the eyes, dark ones at the sides and there are many dark upright forked scales; clypeus, palpi and proboscis deep brown; antennae deep brown, basal segment deep brown with a few pale hairs, base of second segment bright testaceous.

Thorax black clothed with narrow-curved scales of a rich bronzy-brown in the middle, golden-yellow at the sides, forming two prominent broad lateral lines; there are traces of two narrow golden scaled lines on the dark area behind and many golden scales in front of the scutellum, also traces of the two narrow lines seen in front, bristles brown and golden-yellow; scutellum brown with narrow-curved golden scales and brown border-bristles; metanotum deep brown; pleurae deep brown with patches of dense flat creamy white scales and small pale golden hairs.

Abdomen deep brown with violet reflections, basal creamy yellow lateral spots which often spread across the whole width of the segments; venter creamy white.

Legs deep brown, unbanded, femora pale above and below, a few dark scales scattered about above, a small dark area near apex, extreme apex creamy white; ungues equal, all uniserrated.

Wings with the first sub-marginal cell considerably longer and a little narrower than the second posterior cell, their bases

nearly level; stem of the first sub-marginal rather more than one-third the length of the cell; stem of the second posterior



Fig. 130.
Wing of *Culicada aurifer*. ♀. Coquillett.

about two-thirds the length of the cell; posterior cross-vein longer than the mid, not quite it own length distant from it.

Halteres pale with pale creamy scales.

Length.—5·5 to 6 mm.

Habitat.—New Jersey, U.S.A. (J. B. Smith); New Hampshire (D. W. Coquillett); Elizabethtown, N.Y. (E. P. Felt); Connecticut (H. L. Viereck).

Observations.—I have redescribed this from specimens sent me by Professor J. B. Smith from Lahaway, N. Jersey. It is quite distinct and comes in Felt's genus *Culicada*. Coquillett described it from New Hampshire. It is a most bloodthirsty species. It never occurs far from its breeding places, and does not enter habitations. It flies some distance by night, and will attack man during the day if he enters its haunts. The earliest date of appearance is given by Smith as April 23rd, the latest for larvae May 10th, and the adults came out on May 13th. They occurred as adults as late as July 24th.

The larvae have been carefully observed by Brakeley and recorded by Smith. They are usually associated with *Culex canadensis*. He found the first larvae March 23rd in large bodies of water covering the bogs, and in reservoirs and pools. They favour tufts of grass, rushes or vines several feet from shore. The pupa has white air tubes. The eggs are probably laid in the mud.

They were present in a cranberry bog which was dry during the summer of 1902, and till so late in the fall that all mosquito life had gone into hibernation or disappeared. The larvae being found so early led Professor Smith to assume that they hibernate as eggs.

The *larva* varies from $\frac{1}{4}$ to $\frac{3}{8}$ of an inch long, and is brownish-black in colour. Antennae white, tipped with black, almost half as long as the head, thickest near the base and tapering slightly to about the middle, then curved inwards to a blunt point; a tuft of 6 to 10 hairs just beyond the middle. Comb consists of patches of 25 to 30 spatulate spine-tipped scales bearing fine

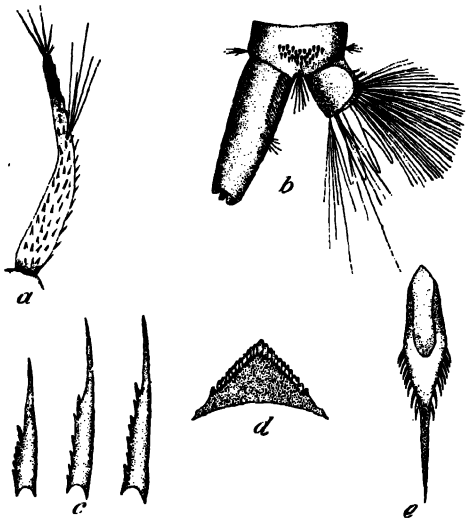


Fig. 131.

Culicada aurifer. Coquillett.

a, Antenna; b, terminal segments and siphon; c, spines of pecten; d, labial plate; e, spine of comb (after Smith).

setae. Pecten of air tube consisting of 14 to 20 small slender spines with two to five serrations near their bases.

Felt places it in his genus *Culicelsa*, but it is clearly quite distinct from the type of that genus (*taeniorhynchus*, Wied.), and on the other hand is closely related in all characters to *cantans*, Mg., and certainly comes in the genus *Culicada*.

Culicada pretans. Grossbeck (1904).

Culex pretans. Grossbeck.

Ento. News, p. 332, Dec. (1904); Mosq. N. Jersey, p. 291 (1904), Smith.

Head brown with pale creamy scales; proboscis and palpi dark brown. Thorax ornamented with bright rich brown and

creamy scales, the first forming a broad nearly parallel-sided median area, two small lateral patches in front, which, however, are really covered with pale scales, but appear as dark areas, and two long lateral ones behind, the creamy scales on two very thin lines between the latter and the median area. Abdomen deep blackish-brown with narrow basal white bands, spreading out laterally, especially on the apical segments. Legs deep brown, unbanded, but with pale reflections.

♀. Head deep brown with dense rather large pale creamy to ochreous narrow-curved scales and pale creamy upright forked scales, flat lateral creamy scales with a central dark patch; clypeus and proboscis deep blackish-brown; palpi deep blackish-brown with dense scales and a few black bristles; antennae deep brown, basal segment partly testaceous, dark on inner side, base of second segment bright testaceous; chaetae of head black, except for a few bright ones between the eyes.

Thorax deep black ornamented with rich brown and creamy scales as follows: a broad median stripe of rich brown narrow-curved backwardly projecting scales, a rather long similar coloured patch on each side behind, running from about the middle of the mesonotum past the wings, these are separated from the median area by a very narrow line of creamy scales, rest of mesonotum with rather larger and thicker creamy scales, which in front on each side of the broad brown stripe are rather more scanty in the middle, giving the appearance of two darker areas, which are more pronounced under a hand lens than under the two-thirds power; the pale scales run around the brown area in front of the mesothorax, and there are also rather large narrow-curved creamy scales in front of the scutellum; chaetae brown, a tuft of shorter creamy ones before the root of each wing; scutellum deep brown with rather large narrow-curved creamy scales and golden-brown to black border-bristles; metanotum deep brown; pleurae black with patches of flat silvery white scales with rounded apices and short pale golden hairs.

Abdomen deep brown with violet reflections, the segments with basal white bands which spread out laterally, the apical segment having the white scales completely surrounding it; first segment with two patches of dark scales and white lateral ones, and pallid thin hairs; border-bristles very pale almost white; venter mostly white scaled.

Legs deep brown, unbanded, under part of femora, tibia and first tarsal segment white, base of femora pale, and knee spot

white, there are also scattered white scales over the upper surface of femora; ungues all equal and uniserrated.

Wings with rather short fork-cells; the scales brown, rather dense; first sub-marginal cell longer and a little narrower than the second posterior cell, their bases nearly level; stem of the first sub-marginal slightly more than half the length of the cell;



Fig. 132.
Wing of *Culicada pretans*. ♀. Grossbeck.

stem of the second posterior cell about three-fourths the length of the cell; posterior cross-vein about the same length as the mid, and a little more than its own length distant from it; halteres pale brown and yellowish with creamy scales.

Length.—5 mm.

♂. In the male there is a trace of a narrow indistinct line of pale scales in the middle of the mesothorax. Palpi deep blackish-brown, last two segments enlarged, with dense brown hair-tufts and similar coloured hairs at the apex of the ante-penultimate segment; antennae with dense deep brown plume hairs with flaxen reflections. Fore and mid ungues unequal, the larger fore ungues biserrate, the smaller uniserrate; mid ungues unequal, but not so much so as the fore, the smaller uniserrate, the larger with one large tooth, and traces of a smaller basal one; hind ungues equal and uniserrate. Claspers long and curved, flattened, apical segment long, dark brown, with a small spine at the base; harpogones expanded at the apex, chopper shaped; two median short, dark, thick curved hooks.

Wings with the fork-cells short, the first sub-marginal longer and narrower than the second posterior cell, its apex nearer the base of the wing, its stem nearly as long as the cell, stem of the second posterior longer than the cell; posterior cross-vein not as long as the mid, its own length distant from it. The apical segment of palp shorter than the penultimate and slightly narrower, apex of the ante-penultimate swollen with a tuft of chaetae, one side arising from well-marked tubercles, the long

ante-penultimate segment notched on the basal half, and some what bent there, the notch almost extending across the segment to form a joint.

Length.—5 mm.

Habitat.—Great Piece Meadow, Trenton, Lake Hopatcong, in New Jersey (J. B. Smith); Hartford, Connecticut (H. L. Viereck); Alaska (Miss Ludlow).

Time of appearance.—May, July, September (J. B. Smith).

Observations.—Re-described from specimens sent me by Professor J. B. Smith.

It is a woodland insect; bites, but not severely, causing no unusual pain or swelling.

Little is known of the bionomics of this species. The larva figured by Smith is not known to be definitely of this species, but "I have no doubt of the correctness," writes Professor Smith. It is said to occur in millions at Hartford, and is troublesome, spreading from the woodland pools to the city.

This larva measures 5·5–6 mm. long; pale grey to dark grey in colour, head yellowish with a large brown blotch; antennae

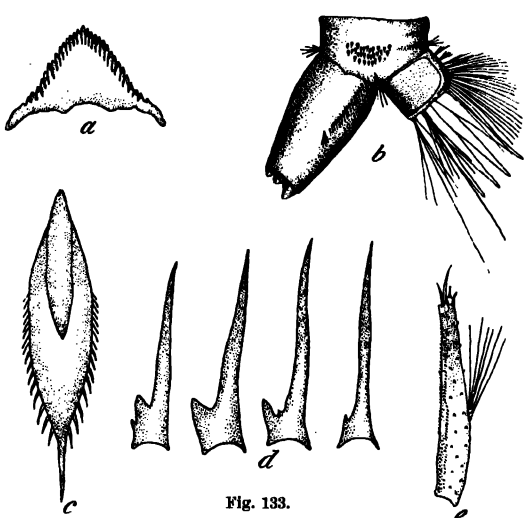


Fig. 133.

Culicada pretans. Grossbeck.

a, Labial plate; b, siphon and apical segments; c, scale of comb; d, scales of pecten; e, antenna (after Smith).

rather short and curved, surface with a few stout spines, and some rows of much smaller ones; lateral tuft of 8–10 hairs situated

well below the middle, apex with one long and some smaller spines, and an articulating segment; labial plate triangular, 15–17 teeth on each side of the apex; lateral combs on eighth segment large, 25–30 scales in each, each scale elongated, with moderate terminal spine and smaller lateral ones; pecten of siphon composed of 16–20 spines in each row, each spine with one or two teeth near the base (J. B. Smith).

The pale scales at the sides of the mesothorax of the adult vary, in some they are of a more golden than creamy colour: this is especially noticeable in a specimen examined from Alaska.

The thoracic adornment at once separates it from others of this genus.

Culicada trichura. Dyar (1904).

Culex trichurus. Dyar.

N. Y. Ent. Soc. Journ. 12, p. 169 (1904), Dyar.

Head brown with silvery-grey scales; proboscis and palpi deep brown; thorax brown with golden-brown scales in the middle, silvery-grey at the sides forming two rather obscure lateral lines. Abdomen deep brown, basally banded white. Legs deep brown, unbanded, femora speckled with yellow and pale ventrally, and at the base. Fork-cells of wings very short.

♀. Head deep brown with rather dense, large narrow-curved silvery-grey scales, a few ochreous upright forked scales in the middle, and dark ones at the sides; lateral scales spatulate, grey; proboscis and palpi deep blackish-brown; antennae very dark, basal segment deep testaceous with a few pale scales.

Thorax deep brown, with scattered rather irregular golden brown scales in the middle, rather broader silvery-grey ones at the sides, forming broad lateral lines, and a few silvery-grey ones in front; chaetae deep brown; scutellum brown, with large narrow-curved pale scales and brown border-bristles with a golden tinge in some lights; metanotum deep brown; pleurae deep ochreous with numerous flat white scales.

Abdomen deep brown with basal white bands and pale brown border-bristles.

Legs deep brown, with a violet tinge in some lights, femora mottled with yellow scales, pale at the base and ventrally; femora,

tibiae and first tarsals with stout black spines; ventral surface of first tarsals and tibiae pale yellowish; ungues all equal, large, uniserrate.

Wings with the fork-cells short; the first sub-marginal longer and narrower than the second posterior, its stem nearly as long as the cell, its base slightly nearer the apex of the wing than



Fig. 134
Wing of *Culicada trichura*. ♀. Dyar.

that of the second posterior cell; stem of the latter nearly as long as the cell which is very broad; posterior cross-vein about as long as the mid, less than its own length distant from it; supernumerary and mid cross-veins meeting at an angle.

Length.—6 mm.

♂. Palpi deep brown, with brown plume-hairs, showing flaxen reflections; last two segments and apex of antepenultimate swollen, the apical not quite as long as the penultimate; antennae deep brown with deep brown plume-hairs showing flaxen hue apically.

Wings with the first sub-marginal much longer and narrower



Fig. 135.
Wing of *Culicada trichura*. ♂. Dyar.

than the short broad second posterior cell, its stem nearly as long as the cell; stem of the second posterior cell slightly longer than

the cell; posterior cross-vein not quite its own length distant from the mid. Fore and mid ungues unequal, the larger bi- the small uniserrated; hind equal and uniserrate.

Genitalia with basal lobe of claspers very broad and ending in a broad truncated apex from which the small clasper arises at the outer corner; central processes broad and terminating in a beak-like extremity.

Length.—6 mm.

Habitat.—Karner and Elizabeth Town, New York (E. P. Felt).

Time of appearance.—May.

Observations.—Redescribed from a series sent me by Professor Felt. It is a very distinct *Culicada*, the thoracic adornment is different to any I have seen with unbanded legs.

The male genitalia are also peculiar. Dyar has described the early stages (N. Y. Ent. Soc. Journ. XII., 169–171 (1904)).

CULICADA DIVERSA. Theobald (1902).

Culex diversus. Theobald.

Mono. Culicid. II., p. 73 (♀) (1902); Ann. Mag. Nat. Hist. Se. 7, XVI., p. 675, Dec., ♂ (1905).

The female only has been previously described; the ♂'s have been bred by Mr. C. O. Waterhouse.

♂. Palpi deep violet black, with traces of yellow scales at the base of the two apical segments and on the antepenultimate segment, the penultimate and apex of the antepenultimate with dense dusky hair-tufts, the apical one with scanty hairs, the two apical segments and apex of the antepenultimate slightly swollen, the last two of nearly equal length, apical segment blunt; the hair-tuft on the apex of the antepenultimate segment very dense. Proboscis deep brown with dull yellow scales at the base. Antennae deep brown, with deep brown plume-hairs.

Thorax as in ♀. Abdomen blackish with basal pale bands, moderately hairy, hairs pale. Genitalia densely hairy, hairs golden; apical segment of claspers curved with the terminal segment long and bent at the tip, a few short spines below its junction with the larger part of the clasper, basal lobe densely hairy in places, especially on the inner side; between the basal lobes a long dense mass of golden hairs, two long curved processes with short spines on their inner lower edge, and a curious group of flattened curved spines forming a prominent object between them and the basal lobes.

Legs deep blackish-brown, except the femora, which are pale beneath. Fore and mid ungues unequal, the larger biserrated, the smaller uniserrated; hind ungues large, simple, uniserrated.

Wings with the first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the apex of the wing, its stem a little longer than the cell; stem of the second posterior cell also longer than the cell; posterior cross-vein about its own length distant from the mid cross-vein.

Length.—5·5 to 6 mm.

Additional localities.—New Forest, Brockenhurst (C. O. Waterhouse) ♂ type; Wye (F. V. Theobald).

Observations.—The ♂'s were bred by Mr. C. O. Waterhouse from larvae taken in pools in the New Forest. The male genitalia are very marked.

CULICADA LAZARENSIS. Felt and Young (1904).

Culex lazarensis. Felt and Young.

Science (N. S.), Vol. XX., No. 505, p. 312, nom. nud. (1904), Felt and Young; Bull. 79, Ent. 22, N. York St. Mus., p. 309 and 391b, App. (*Culicada lazarensis*) (1904), Felt.

Head golden-yellow scaled. Proboscis brown, unbanded. Thorax golden-yellow scaled with two broad brown sub-median lines and a very narrow median one. Abdomen deep brown with basal white bands. Legs brown, unbanded. Wings normal.

♀. Head deep brown clothed with rather broad curved golden-yellow scales above, flat golden-yellow ones laterally, golden-yellow upright forked scales in the middle, black at the sides; palpi brown with a few scattered ochreous scales and long black bristles; proboscis long, deep brown; antennae brown, scapus with small flat creamy scales, basal segment of flagellum testaceous; clypeus black with a blunt process on each side towards the base.

Thorax deep brown clothed with golden-yellow narrow-curved scales sloping backwards with a very thin median dark line formed mainly by the median line of black chaetae, two broad dark sub-median lines clothed with dull narrow-curved scales, which are scarcely perceptible with a hand lens; lateral chaetae and those at base of wing dark brown, strong; scutellum densely clothed with rather broad golden-yellow scales, metanotum deep brown; pleurae pale brown with dense masses of flat grey scales.

Abdomen deep brown with basal bands of creamy-white scales, golden-brown border-bristles; venter mostly white-scaled.

Legs deep brown, unbanded, femora pale yellowish at base and beneath, apex white; a few pale sheened scales beneath the tibiae and first tarsals; ungues all equal and uniserrate.

Wings with yellowish veins and brown scales; first sub-marginal cell longer and narrower than the second posterior cell, its apex slightly nearer to the apex of the wing than that of the



Fig. 136.
Wing of *Culicada lazarensis*. ♀. Felt.

second posterior cell, the stem about two-thirds the length of the cell; stem of the second posterior as long as the cell; posterior cross-vein about its own length distant from the mid; lateral vein scales long and thin, the median broad and long.

♂. Thorax as in ♀; abdomen similar but with a few yellow scattered scales on the dark area, with fine long golden hairs. Palpi with the two apical segments swollen, the penultimate longer than the apical, hair-tufts brown, a trace of a pale band at base of former. The apical segment more swollen than the penultimate. Antennae brown with pale bands and deep brown plume hairs.

Ungues of fore legs *short, thick*, unequal and uniserrate; of the mid unequal, uniserrate, the larger much longer than the smaller; hind equal and uniserrate.

Wings with first sub-marginal cell much longer and narrower than the second posterior cell, its apex nearer the apex of the wing, its stem as long as the cell; stem of the second posterior longer than the broad cell; posterior cross-vein about two-thirds its own length distant from the mid.

Length.—5·5 to 6 mm.

Habitat.—Elizabethtown, New York, U.S.A., and Karner, N.Y. (E. P. Felt).

Time of appearance.—June.

Observations.—Re-described from a series sent me by Professor Felt bred from larvae taken in a deep cold mountain pool on

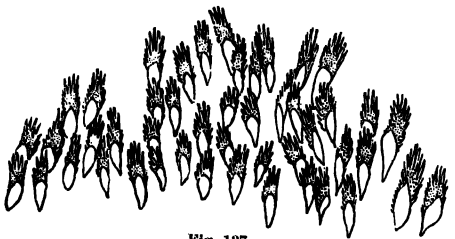


Fig. 137.
Comb of *Culicada lazarensis* (after Felt).

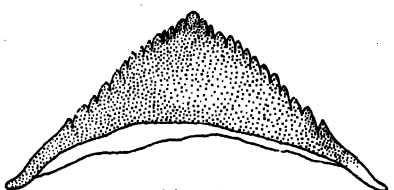


Fig. 138.
Labial plate of *C. lazarensis*. Felt.



Fig. 139.
Pecten teeth of *C. lazarensis* (after Felt).

June 9th. The larvae were also found at Karner on May 3rd. It is a very beautiful species, coming close to *C. cantans*, but at once told by the thoracic ornamentation. In the male the fore ungues are very short and thick.

Note.—Felt states that in the ♂ the outer claw of fore leg is simple; those I examined had a tooth near base, and resemble the figure he gives showing it (Fig. 46).

The larva is detailed by E. P. Felt, who kindly sent me specimens. The main characters are as follows:—

"*Larva* nearly ½ inch long when full grown, frequently greenish, turning to a slaty colour after death. Antennae nearly straight, tapering uniformly and with a tuft at the basal third, tip bearing one very long and two medium sized, slender processes, one shorter, much stouter, almost conical process, and a very

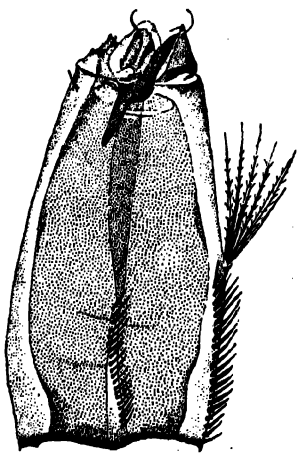


Fig. 140.
Siphon of larval. *C. lazarensis.* Felt. (After Felt.)

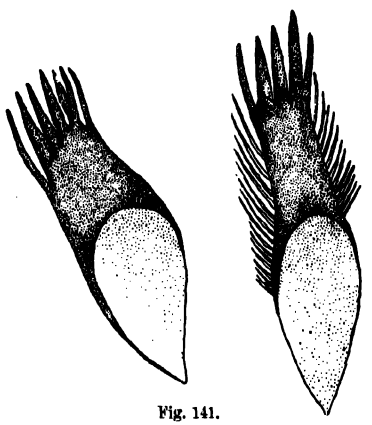


Fig. 141.
Comb scales of *C. lazarensis.* Felt. (After Felt.)

stout knob-like remnant of a segment. Mentum triangular, with about 27 fine teeth. Comb consisting of a triangular patch of about 60 rather stout scales, each tipped with from four to seven stout equal spines. Air tube short, a little over twice as long as broad, bearing a double row of posterior pecten, each of about 20 short, thick, blunt spines, usually with two well-marked teeth at extreme base. (Felt figures more, however.—F. V. T.) Anal gills slender, acute at tip."

The larva somewhat resembles that of *C. impiger*, but may easily be recognised by the conspicuous triangular comb and other structural details.

CULICADA ABSERRATA. Felt (1904).

Culex abserratus. Felt and Young.

Culex punctor. Dyar and Smith (non Kirby).

Science N. S. XX., 505, p. 313 (1904), nom. nud; Mosq. N. York State, Bull. 79, Ent. 22, N. Y. St. Mus., p. 329 (1904), Felt; Rept. Ent. Dep., N. Jersey, Exp. St. for 1905, p. 681 (1906) Smith; Proc. Ent. Soc. Wash. VI., p. 39, and Journ. N. Y. Ent. Soc. XII., Dyar.

Head with ochreous scales; palpi of ♀ and proboscis deep brown; thorax with golden-yellow scales, traces of a narrow median dark line, a broader brownish one on each side, ornamentation very obscure. Abdomen dark brown with basal white bands, prolonged laterally on the last few apical segments. Legs brown, unbanded; ♀ ungues all uniserrated.

♀. Head deep brown, with rather large narrow-curved pale ochreous scales and ochreous upright forked scales; proboscis long and thin, deep blackish-brown with violet reflections; palpi brown, of four segments, the apical one minute, the penultimate large; antennae blackish, basal segment pale testaceous, darker on the inside with a few small flat pale scales.

Thorax deep brown, clothed with thin narrow-curved golden-yellow scales, the median ones running parallel with the long axis of thorax, the lateral ones obliquely, thus giving an ornamented appearance to the mesonotum, the median area appearing somewhat darkened, and it has a very thin median nude line; posterior and lateral bristles pale golden; scutellum testaceous and brown, with narrow-curved pale golden-yellow scales, border bristles bright brown; metanotum testaceous, dark in the middle; pleurae rich brown with small flat grey scales.

Abdomen deep brown with basal white bands, which spread out laterally on the fifth, sixth and seventh segment, border-bristles pale; venter mostly pale scaled.

Legs deep brown; femora pale grey beneath; tibiae bristly; ungues all equal and uniserrated, rather thick; hind tibiae slightly shorter than the femora.

Wings with the fork-cells rather small, the first sub-marginal longer and narrower than the second posterior, their bases nearly level, that of the first sub-marginal slightly nearer the base of the wing, its stem rather more than half the length of the cell; stem of the second posterior nearly as long as the cell; posterior

cross-vein about its own length distant from the mid; halteres with ochreous stem and grey-scaled knob.

Length.—5 mm.

♂. Antennae and palpi black; hair-tufts of latter rich brownish-black, apical portion clavate; fore ungues very unequal,



Fig. 142.
Wing of *Culicada absorrata*. ♀. Felt.

both uniserrate, the larger with a bend in the middle giving a marked sinuous appearance; the mid are also unequal, but the larger one is simply curved, both uniserrate; the posterior pair equal and uniserrate. Genitalia has basal segment of clasp stout, irregularly curved, rounded; apical portion nearly strap-shaped; describing almost a semicircle and with a curved blunt spine apically; harpes long, irregularly curved, pointed. At extreme base, slightly anterior of the basal segment of the clasp, there is a pair of short fleshy organs tipped with four or five stout spines.

Length.—5·5 mm.

Habitat.—Elizabeth Town and Nassau, New York (E. P. Felt).

Time of capture.—May and June (E. P. Felt).

Observations.—Re-described from a perfect ♂ and ♀ sent me by Professor Felt.

The male ungues are very marked, and do not agree with what Felt states:—"Ungues of the front tarsi on male side unequal, all others and those of female side equal."

Felt seems to have described an abnormal specimen, for an hermaphrodite insect can only be looked upon as such. He states:—"Described from a single bred, bisexual individual."

The specimens he sends me are normal and quite distinct from any other species I know. They certainly come in the genus *Culicada*, and not *Culex* as Felt mentions, although at first sight it resembles *C. fatigans* and, on closer examination, *C. dentatus*, Theob., owing to the ♀ uniserrate ungues.

The structure of the thoracic and wing scales differs and

also the palpi, so that they cannot be confused if examined microscopically.

Life-history and habits.—Felt bred the first specimen from a



Fig. 143.
Combs of *Culicada aberrata*. Felt. (After Felt.)

larva taken in a cold mountain pool in June, associated with *lazarensis, cinereoborealis* and *Corethras*.

The larva is described by Felt as follows :—

"Antennae rather stout with a slight basal enlargement tapering almost uniformly therefrom; tuft at basal third, apex bearing one long

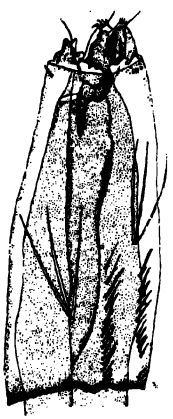


Fig. 144.
Air siphon of *Culicada aberrata*. (After Felt.)

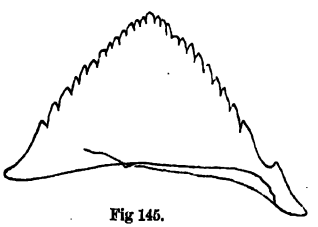


Fig 145.
Labial plate of *C. aberrata*.
(After Felt.)

and one medium slender process, a smaller one and also a much stouter rudimentary segment. Labial plate rather broadly triangular, bearing twenty-seven fine triangular teeth. Thorax with compound, finely barbuled

hairs; abdomen mostly with simple ones. Comb with six or seven scales arranged in a curve, each with a large, finely setose, spatulate base and with a large, apical spine. Air tube three times as long as wide, tapering regularly, with double posterior pecten on basal third, each row consisting of twelve to fifteen closely set stout, black spines, each bearing near the basal third one large and usually a smaller tooth. Barred area short, dense, bearing numerous long, branching hairs. Anal gills long, slender, uniformly tapering."

Culicada cinereoborealis. Felt and Young (1904).

Culex cinereoborealis. Felt and Young.

Science XX., No. 505, p. 312 (1904), nom. nud., Felt and Young; Bull. 79, Ento. 22, N. York St. Mus., p. 312, pls. 7, 20, 21, 26, 36, 45, 52, 55, Oct. (1904), Felt.

"Thorax brownish-grey, with central portion browner; abdomen brown with basal white bands expanded at the sides; legs dark brown, coxae pale, femora light beneath; ungues unidentate in ♀, unequally toothed in ♂.

♀. Brownish-grey; proboscis long; palpi dark brown with base lighter than tips; occiput with white narrow-curved leaf-like scales at

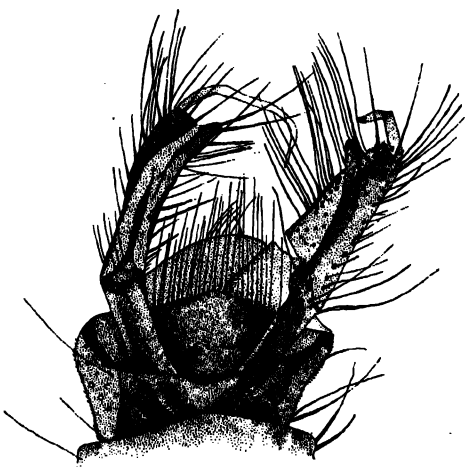


Fig. 146.
Male genitalia of *C. cinereoborealis.* Felt. (After Felt.)

centre, broad truncate ones at sides; numerous upright, narrow, forked, yellowish or dark scales are interspersed among the others; black bristles extend forward with a few yellowish ones on the median line; antennae dark brown, base of first joint pale. Thorax brownish-grey, a brown

spot at the middle, becoming wider behind the middle with the sides often separated from the central part by a narrow white line, lighter at the sides, with yellowish or golden scales. Pleura thickly clothed with white scales. The denuded thorax shows a median narrow brown line bordered with a lighter almost plumbeous one on each side. Abdomen brown, with a broad white band, somewhat expanded laterally, at the base of the segments. Yellowish-white scales are scattered over the abdomen, while clusters almost form a median stripe, which is more apparent in bred or unabraded specimens. Ventral surface clothed with white scales. Legs dark brown; femora yellowish, lighter beneath and almost black at apex. Anterior and mid tibiae lighter beneath, posterior tibiae show dark purple reflections in sunlight. Tarsi unicolorous, almost black; ungues unidentate. Wings large, thick, venation strongly

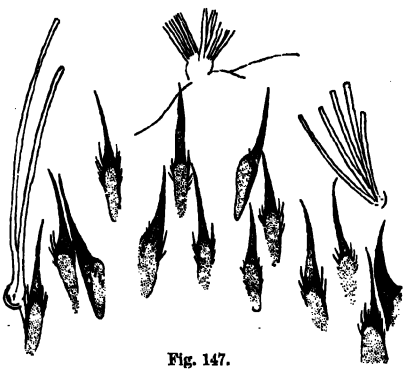


Fig. 147.

Comb of *C. cinereoborealis*. (After Felt.)

marked; petiole of first submarginal cell almost as long as cell; posterior cross-vein less than its own length from the nearly equal mid cross-vein.

♂. Head, similar in colour to that of female; the antennae and palpi uniformly brown; thorax with brown spots more extended, more golden and yellowish scales, and with fewer white scales laterally and on the pleura. Abdomen more slender than in the female; basal bands narrower, with very few scattered yellowish scales, numerous long flying hairs becoming quite dense at apex. Legs long, same colour as female; first segment of posterior tarsi almost as long as tibiae; posterior ungues equal, unidentate; the fore and mid feet bear one large claw with two teeth and a smaller one with one tooth. Wings longer and narrower than in the female; petioles of the first and second submarginal cells longer than cell, posterior cross-vein about its own length from mid cross-vein.

Length.—7 mm.

Habitat.—Albany, U.S.A.

Time of appearance.—May.

Larva.—Length, $\frac{5}{16}$ inch; head light or yellowish brown, widest just behind the black eyes; antennae nearly straight, almost cylindric, slightly

darker at the somewhat enlarged base and with a scanty tuft arising at the basal third. Labial plate broadly triangular, with twenty-five fine teeth. Thorax, lateral angles somewhat marked, and each bearing a group of compound, finely barbuled hairs. A similar group also occurs at the anterior angle, which is less sharply defined, and also on the dorsal surface. Hairs of body mostly simple, those on the first and second abdominal segments compound and weakly barbuled. Comb of eighth abdominal segment consists of fourteen to sixteen scales, each having a somewhat spatulate base and terminated by a stout spine, at the base of the latter on either side is a much smaller spine followed by a series of still smaller weaker ones. Anal segment, with a broad dorsal plate, extending nearly to the ventral line but not inclosing the segment. Air tube about two and a half times as long as broad tapering rather gradually to the apex with two posterior pecten, each consisting of about eighteen spines closely placed together and four others at a much greater distance. Each pecten tooth stout and with one or two denticulations; dorsal surface of the air tube with a double row of hair-tufts, each consisting of about four tufts composed of a pair of weakly barbuled hairs.

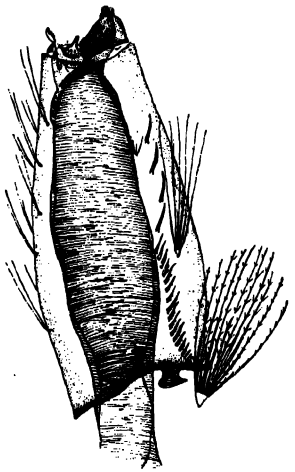


Fig. 148.
Air tube of *Culicada cinereoborealis*. (After Felt.)

Habits.—This large species is a frequenter of woodland pools in the vicinity of Albany, where it occurs with *C. canadensis*, *C. impiger*, *C. cantans*, and *Aedes fuscus*. We believe the species winters in the larval form (E. P. Felt)."

The larva is said to resemble that of *Culex impiger*, but the dorsal surface of the air tube has a double row of hairs, each row consisting of about four tufts composed of a pair of weakly barbuled hairs. It has been confused by Messrs. Dyar and Knab (Ent. Soc. Wash. Proc. 6, 144, 1904) with that of *C. impiger* with which it sometimes occurs.

CULICADA NEMOROSA. Meigen (1818).

Culex nemorosus. Meigen (1818).
Culex sylvaticus. Meigen (1818).
Culex guttatus. Curtis (1835).
Culex provocans. Walker (1848).
Culex salinus. Ficalbi (1896).
Culex reptans. Meigen (? 1804).
Culex fasciatus. Meigen (? 1804).
Culex stricticus. Meigen (? 1838).

Syst. Beschr. Eur. Zweiflügel, 1, 4, 3 (1818), Meigen; Mém. Soc. d'Hist. Nat. Paris, III., 406, 17 (1827), Rob.-Desvoidy; Syst. Beschr. VI., 241 (1830), and Abbild. Europ. Zweiflügel Ins. I., tab. 1, fig. 5 (1830), Meigen; Ins. Lappon., 806, 2 (1838), Zetterstedt; Naturhist. Tidsskr. II., 553, 2 (1839), Staeger; Dipt. Scand. IX., 4357, 3 (1880), Zetterstedt, and XII., 4836, 3 (1855); Ins. Brit. Dipt. III., 247, 5 (1856), Walker; Fauna Austr. II., 628, 8 (1864), Schiner; Bull. Soc. Ent. Ital. IV., 30, 3 (1872), Rondani; Dipt. Neerl. I., 327, 7 (1877), Van der Wulp; K. Danske, Vid. Selsk. Skrift. III., 377, tab. 1, figs. 17–19 (1886), Meinert; Archiv. fur. Naturgesch. LIII., 1, 133, Pls. V.–VI. (1887), Rascke; Bull. Soc. Ent. Ital. XXVIII., 284, 35 (1896), and XXXI., 177, 5, figs. 59–61 (1899); Bull. Soc. Ent. (1896), p. 109 (= *stricticus*, Meig.), reprint; Noti Sulla Zanz. Ital. IXa. Nota (*C. salinus*), and Venti Spec. Zanz. Ital., p. 129 (1899), Ficalbi; Bull. Soc. Ento. Ital. XXXI., 259 (1899), Noè; Gnats, 306, 104 (1900), Giles; Mono. Culicid. II., 80–86, figs. 189, 190 (1901), Theobald; Die Malaria, Pl. IV., fig. 31 (1901), Grassi; Gnats, Ed. II., 436, 81 (1902), Giles; Állatt. Közl. III., 47 (1904), Kertész; Ann. Mus. Nat. Hung. III., 85 (1901), Theobald.

Culex sylvaticus. Syst. Beschr. 1, 6, 8 (1818), Meigen; Recueil Soc. Sc. Agri. Lille, 217, 3 (1826), Macquart; Mém. Soc. d'Hist. Nat. Paris, III., 409, 31 (1827).

Culex guttatus. Brit. Entomo. 537 (1835), Curtis; Bull. Soc. Entomo. Ital. XXVIII., 286, 37 (1896), Ficalbi; Gnats, 317, 121 (1900), Giles.

Culex provocans. List. Dipt. Brit. Mus. I., 7 (1848), Walker.

Culex reptans. Klass. 1, 3, 2 (1804), Meigen.

Culex fasciatus. Klass. 1, 4, 5 (1804), Meigen.

Culex stricticus. Syst. Beschr. VII., 1, 20 (1838), Meigen; Fauna Austr. II., 629 (1864), Schiner; Bull. Soc. Entomo. Ital. XXVIII., 283, 32 (1896), Ficalbi; Gnats, 322, 128 (*stricticus*) (1900), Giles.

This wood mosquito comes in Felt's genus *Culicada*.

It has been recorded from the following additional localities: Germany and various places in Hungary (Kertész); Altenfjord, Finmark (Sir George Hampson) (July). In Britain Mr. C. O.

Waterhouse has taken it in the New Forest, and myself in Epping Forest and at Wye.



Fig. 149.
Wing of *Culicada nemorosa*. ♀. Meigen.

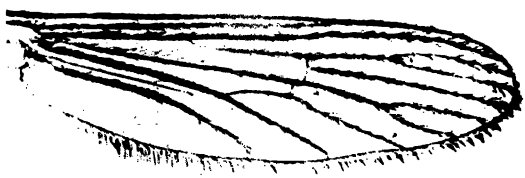


Fig. 150.
Wing of another *Culicada nemorosa*. ♀. Meigen.

CULICADA PUNCTOR. Kirby (1837).

Culex punctor. Kirby (non Dyar and Smith).

Fauna Boreali-Americana Ins., p. 308 (1837), Kirby; Cat. Dip. Ins. Brit. Mus. I., p. 6 (1848) Walker; Mono. Culicid. II., p. 75 (1901), Theobald.

There is considerable confusion regarding this species. The



Fig. 151.
Wing of *Culex punctor*. ♀. Kirby.

American observers take a totally different insect to be *punctor* to that placed in the Museum collection.

GENUS **LEUCOMYIA.** nov. gen.

Head covered with narrow-curved scales and some irregular flat lateral ones and upright forked scales; mesothorax and scutellum and prothoracic lobes with narrow-curved scales; a tuft of elongated, outstanding flat scales at the root of the wings; palpi short in the ♀, composed of five segments, the apical one minute, the penultimate longer than the rest, antepenultimate broadest, the two basal ones small; long in the ♂, composed of three segments, acuminate, slight hair-tufts. Male genitalia with very broad flat short claspers; harpes short and blunt ending in spines; harpogones blunt and also short.

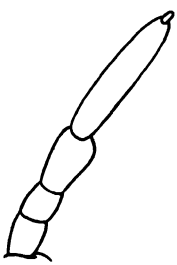


Fig. 152.
Palp of ♀ *Leucomyia gelida*. Theobald.

Wings with rather dense broad linear lateral vein-scales; median vein-scales rather large and spatulate, especially prominent over the first, third, and fourth veins and the fifth, not on the branches of first fork-cell.

The structure of the male genitalia bring it near both *Janthinosoma* and *Grabhamia*. It may be related to the latter but is very distinct from the former genus.

Two well marked species come in this genus, namely, *Culex gelidus*, Theobald, and the new species described here—the former is taken as the type of the genus. The wing scaling is accentuated in *plegepennis*.

Culex quasigelidus, Theob. (Mono. Culicid. III. p. 181) also probably comes here.

The species all have densely silvery-grey scaled areas in front of the mesonotum.

LEUCOMYIA GELIDA. Theobald (1901).

Culex gelidus. Theobald.

Mono. Culicid. II., p. 21 (1901) and III., p. 180 (1903).

♂. Palpi longer than the proboscis by more than the apical segment, which is acuminate, the penultimate segment shorter than the antepenultimate, both segments with long brown hairs on each side, but not forming noticeable tufts, a series of long hairs also on one side of the slightly swollen apex of the antepenultimate segment. Antennae normal, grey with brown verti-

cillate bands. Fore and mid ungues unequal, the larger with a large tooth, and the small with a small basal acute tooth.

Wings with the fork-cells rather short, the first sub-marginal longer and narrower than the second posterior cell, its stem about two-thirds the length of the cell; stem of the second posterior cell a little more than half the length of the cell, which is expanded apically; the posterior cross-vein about twice its own length distant from the mid cross-vein.

Genitalia with large basal lobes, narrowing apically, with a dark lateral process bearing several small spines and one larger



Fig. 153.
Male palp of *Leucomyia gelida*. Theo.

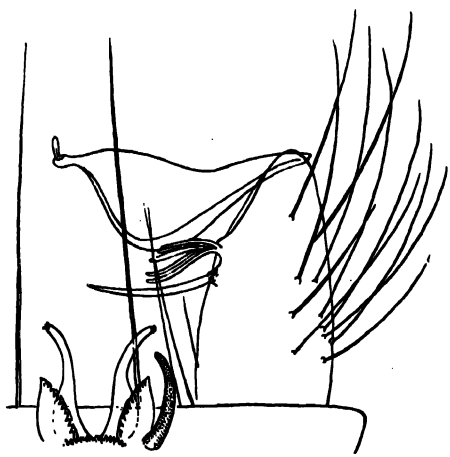


Fig. 154.
Male genitalia of *Leucomyia gelida*. Theobald.

one; clasper short and much curved on one side, very broad and abruptly bent at the end; harpes dark, short and blunt, curved almost at right angles towards the apex, which has a minutely spinose appearance; harpogones large, dark and curved.

Length.—4·5 mm.

Additional localities.—Philippine Islands (Miss Ludlow); Sarawak (Dr. A. J. G. Barker); Maskeliya, Ceylon (E. E. Green).

Observations.—Miss Ludlow's specimens bear on label, "taken by Dr. Whitmore in quarters." The specimens taken in Sarawak were taken in November, those in Ceylon in April.

LEUCOMYIA GELIDA. Theobald (1901).

var. *cuneata.* Theobald.

Mono. Culicid. II., p. 22 (1901).

Additional locality.—Philippine Islands (Miss Ludlow).

LEUCOMYIA GELIDUS. Theobald.

variety *bipunctata.* n. v.

Resembles the type in all respects, but the frosty scaled anterior region of the thorax has two prominent brown spots on the middle of the anterior region. Abdomen has the basal pale bands extending in the middle nearly across some of the segments.

♂. Head brown, clothed in the middle with snow-white small narrow-curved scales and similar coloured upright forked scales, brown scales at the sides. Palpi brown, longer than the proboscis, with four yellow bands, the second from the base the broadest and corresponding with the pale band on the proboscis; apical segment acuminate, last two segments with brown hair-tufts, but not very dense, of about equal length.

Thorax brown, the anterior two-thirds clothed with small, dense, narrow-curved, snowy-white scales, which end in an irregular wavy line; on this area are two distinct round brown spots on the anterior portion; posterior third with brown scales; dense black chaetae over the roots of the wings; scutellum pale brown with brown narrow-curved scales and seven brown posterior border-bristles; metanotum pale brown; pleurae pale with two or three dusky spots. Abdomen deep brown with basal white bands, which spread out in the middle to form long median projections and long white lateral lines; posterior border-bristles pale golden.

Legs as in the ♀; fore and mid ungues unequal, uniserrate, the tooth of the smaller basal; hind ungues equal and simple.

Wings with the first sub-marginal cell longer and much narrower than the second posterior cell, its base nearer the base of the wing, its stem about half the length of the cell; stem of the second posterior about three-fourths the length of the cell; posterior cross-vein more than twice its own length distant from the mid cross-vein.

Claspers of genitalia short, thick, curved, swollen on the apical half just after the curve, terminal segment shaped like a haltere; lateral process of basal lobe with large spines and a foliate plate; harpes and harpogones short, thick, curved.

Length.—5 mm.

Habitat.—India (Major Aldrich); Sarawak (Dr. Barker).

Observations.—This variety resembles the type in general appearance, but the abdomen resembles that of variety *cuneata*, Theob. It can at once be told by the two very marked brown spots on the pale area of the thorax.

The ♂ genitalia resemble *Culex pipiens* and *C. fatigans*, but can at once be told by the broader claspers found in this genus.

LEUCOMYIA PLEGEPENNIS. n. sp.

Head and greater part of thorax covered with silvery-grey scales, back of thorax darker, sending two small dark projections forwards; palpi deep brown; proboscis banded. Abdomen brown with a median grey line and small pale apical lateral spots. Legs brown with narrow basal white bands. Wings with some of the veins dark brown, others pale.

Somewhat resembling *C. gelidus*, Theob.

♀. Head deep brown, clothed with narrow-curved grey scales and grey upright forked scales and flat lateral scales; palpi small, deep brown; proboscis deep brown with a broad median pale creamy band; antennae deep brown, the basal segment and base of the second segment testaceous.

Thorax deep brown, clothed with narrow-curved silvery grey scales for about three-fourths of its length and sending a narrow lateral line of similar coloured scales down to the scutellum, the posterior one-fourth clothed with very small brownish scales which spread anteriorly into the pale area as two square dark patches following the lines of chaetae and separating a median grey-scaled area from the thin grey lateral lines; chaetae brown behind, black in front, very prominent; scutellum brown with narrow-curved grey scales and five golden-brown posterior border-bristles to the mid lobe; metanotum deep brown.

Abdomen brown, basal segment light ochreous, with a median patch of greyish scales and pallid hairs; the second to seventh segments with a median creamy stripe, broadening out basally on each segment and with small pale apical lateral spots, in the seventh segment they are not quite apical, eighth segment with

two basal lateral white spots; posterior border-bristles slight, very pale golden; venter with creamy scales.

Legs brown, pale basally, femora and tibiae spiny; in the fore legs the second to fourth tarsals have basal white bands, and there is a small pale knee spot, and another at the tibio-metatarsal joint; in the mid legs there is a pale spot at the base of the tibia, and all the other segments have basal white bands, the last tarsal with a very indistinct one; on the tibiae pale reflection may be noticed in certain lights, giving them a dull grey hue, especially on the apical half; in the hind legs there are pale basal bands to all the segments except the last tarsal; ungues all equal and simple.

Wings with dark brown and very pale brown scales in lines, in some lights the paler scales seem almost grey; the paler scales occur on the second long vein and its branches, on the fourth long vein and the basal part of its upper branch, the thin lateral scales of the third, fourth and fifth veins are also pale; the first, third, lower branch of the fourth, apex of the upper branch and the fifth noticeably dark scaled, the median vein scales being broad and spatulate, with a central row of much smaller ones; first sub-marginal cell longer and slightly narrower than the second posterior cell, its stem about one-half the length of the cell, its base about level with that of the second posterior cell, the stem of which is about half the length of the cell rather more than three times its own length distant from the mid; border-scales of fringe spatulate, rather large and very dark, fringe scales paler with violet reflections.

Halteres pale.

Length.—5 mm.

Habitat.—Kobe, Japan (Mr. Cornford).

Time of capture.—September.

Observations.—Very similar to *gelidus*, Theobald, but much slighter in build and with longer legs. The thoracic ornamentation is very marked, the two dark areas projecting into the pale scaled region showing very prominently. The light and dark colouring of the wings is also pronounced, and gives them almost a striped appearance in some lights.

Genus **CULICELSA.** Felt.

Bull. 79, Ent. 22, N. York St. Mus., p. 391, 6 (1904).

Professor Felt founded this genus on *Culex taeniorhynchus*, Wiedemann. It is certainly a good one on scale structure. Felt's characters of venation will not hold, but the genitalic characters will augment those of the squamose nature of the wing, the only way we can separate female and male from a true *Culex*.

Head, thorax and abdominal scales as in *Culex*. Terminal segment of ♀ palp small and rounded, palpi composed of four segments in ♀.

Wings with short fork-cells; scales denser and the lateral vein scales rather broader than in *Culex*, especially in the ♂, median vein scales much denser, especially on second and third long veins, but also on the others, those on second vein of *more than two rows*. Petiole of first fork-cell of ♀ about half its length. Terminal clasp segment of ♂ genitalia swollen at base; harpes with a peculiar retrose spine.

Larva with short air tube, the comb composed of numerous spatulate, spined scales.

Prof. E. P. Felt includes *aurifer* of Coquillett here also.

Culicelsa taeniorhynchus. Wiedemann (1821).

Culex taeniorhynchus. Wiedemann (1821).

Dipt. Exot., p. 43 (1821); Mono. Culicid. I., p. 350 (1903), Theobald; Bull. 79, Ento. 22, N. York St. Mus., p. 301 (1904), Felt; Mosq. Jam., p. 22 (1905), Theobald and Grabham; Mosq. N. Jersey, p. 216 (1905), Smith.

Additional localities.—Connecticut (H. L. Viereck); New York (E. P. Felt); New Jersey (J. B. Smith); Fort Caswell, N. Carolina; Fort Apache, Arizona; Fort Howard, Maryland; Fort Morgan, Alaska; Rock Island Arsenal, Illinois; South Carolina; Florida; Louisiana; Fort Monroe, Virginia; Fort Rodman, Massachusetts; Fort Screven, Georgia; Fort Wright, Washington (Miss Ludlow).

Observations.—There are some slight differences between the larval characters given by J. B. Smith and those given by Dr. Grabham, mainly in the form of the mentum (vide figures), but Smith figures two forms of mentum; it is thus evident that this structure varies. The structure of the antennae also varies, so that with these two differences and the differences in habits

of the adult, it is possible that Smith's *taeniorhynchus* is a distinct species, but as both are littoral, I do not think the small structural discrepancies in larval characters are of any value, particularly as the adults exactly agree.

Everywhere it bites viciously, especially during the day, and is noted as a pest in seaside towns. Mr. Viereck found that in New Jersey it was attracted at night (especially gravid ♀'s) to electric lights. J. B. Smith states that it is strictly a marsh species, and has never been found breeding anywhere else in New

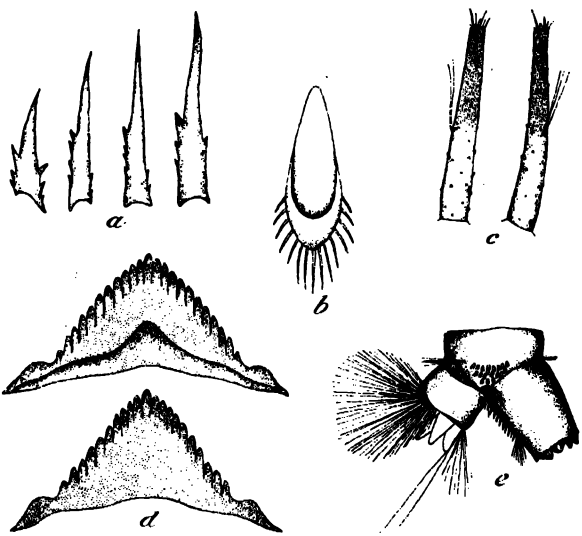


Fig. 155.

Culiselsa taeniorhynchus. Wied. (After Smith.)

a, siphon scales; b, scale of comb; c, antennae; d, two forms of labial plates e, siphon and anal segment.

Jersey. It does not seem to occur there indoors, but I have already recorded it as abundant in houses in British Guiana (Mono. Culicid. I., p. 353, 1901).

The egg-laying habits are like those of *Grabhamia sollicitans.*

The *larva* is 7 to 8 mm. long, of a dirty grey or yellowish colour; the antennae figured by J. B. Smith have a small terminal plate, a few short and one long bristle and a lateral tuft of two or three long hairs about the middle, and are dark apically. Those examined from Jamaica answered in all respects, but

the lateral tuft is more basal, and I could only detect one hair in some, two in a few. The mentum, according to J. B. Smith, has from 10–12 teeth on each side, and varies slightly in general form. Those examined varied in form more than Smith's, but have the same number of lateral teeth. The scales of the eighth segment are oval, with about 17 spines, and vary in number from 16 to 22.

The siphon is short and broad, with two rows of spines 16–20 in number, which vary in form, but are serrated on each side. Anal gills very short.

Life-history and habits.—This mosquito occurs in houses, hospitals, &c., and also in the open. It bites rather severely.

Structural parts of the larva are shown in figure. The figures of the larvae given by Prof. John B. Smith in Bulletin 171, New Jersey Agricultural Station, Feb. 8th, 1904, Plate VI., do not agree with those sent by Dr. Grabham. What species Professor Smith's belong to I do not know, but Dr. Grabham's belong undoubtedly to *C. taeniorhynchus*, Wiedemann.

Economic importance.—This species is a vicious biter in Jamaica, and is of particular importance on account of its frequency in seaside towns.

Culicelsa togoi. n. sp.

Head deep brown, with paler scales and a small prominent white spot on each side; proboscis deep brown, unadorned. Thorax deep brown with golden scales in more or less lines, the brown scales most prominent on each side in front and over the roots of the wings, but present between the pale scaled lines. Abdomen black with basal snow-white bands, which are represented by lateral spots on the last two segments. Legs black with basal white bands.

♀. Head deep brown, with pale creamy narrow-curved scales, a small prominent patch of flat white scales on each side, then flat dark scales; numerous narrow, black, upright forked scales; a pale border around the eyes; palpi rather long deep brown with white scales apically; proboscis black; antennae deep brown, basal segment pale with some small flat white scales, the second segment rather enlarged with small flat black and white scales; verticillate hairs black, internodal pilosity pale.

Thorax deep brown with rather broad curved golden scales, somewhat paler over the roots of the wings, and with deep brown

chaetae, some golden at the base, the golden scales show somewhat linear arrangement; scutellum brown with pale curved scales and seven brown border-bristles to the mid lobe; metanotum brown.

Abdomen black with snowy-white basal bands, the apical segment with two basal lateral snowy-white spots, border-bristles and lateral hairs pale golden.

Legs deep brown, femora pale at the base, knee spots pale; fore legs with a white band at the base of the first tarsal, mid with white bands on second to fourth tarsals, that on the fourth minute, the bands more pronounced on the hind legs and involving both sides of the joints on all the legs; ungues of fore and mid legs equal and uniserrate, on the hind equal and simple.

Wings rather short; fork-cells short and the scales rather dense, median vein scales broad, long and diverging; first submarginal cell a little longer and narrower than the second posterior cell, its base a little nearer the apex of the wing, its stem rather more than half the length of the cell; stem of the second posterior cell also about half the length of the cell; posterior cross-vein twice its own length distant from the mid.

Length.—4 to 4·5 mm.

Habitat.—Osaka, Japan.

Observations.—Described from two perfect females. It is very marked, the dark thorax with broad golden curved scales, deep blackish-brown abdomen with snowy-white basal bands and white banded legs separate it from all other *Culicids.* It is somewhat aberrant from the genus *Culex*, but I can see nothing to exclude it unless it is placed on account of the rather dense wing scales with *C. taeniorhynchus* in the genus *Culiselsa*, Felt.

Culiselsa auroides. Felt (1905).

20 Rept. St. Ent. N. Y. St. Bull. 97, Ent. 24, N. York St. Mus., p. 449 (1905).

Head with golden yellow scales. Proboscis dark brown, unbanded. Thorax with conspicuous median stripe of rich brown scales, becoming yellowish and paler posteriorly, a short sublateral line of same colour on posterior third, rest of mesonotum golden yellow scaled. Abdomen with basal yellowish-white bands. Legs brown unbanded.

"♀. Proboscis dark brown, about two-thirds the length of the body. Palpi short, dark brown, third segment about one-third the length of the

stout uniform fourth segment; fifth rudimentary. Antennae a little shorter than the proboscis; basal segment yellowish brown, fuscous internally and with an inconspicuous patch of whitish scales dorsally and internally; other segments dark brown, with median basal whorls and thickly clothed with short golden setae. Occiput thickly clothed with curved, golden yellow scales and with numerous, erect, golden yellow fork scales posteriorly. Mesonotum with a conspicuous median stripe of rich brown scales, becoming yellowish, thinner and obsolete posteriorly. A short sub-lateral line of the same colour occurs on the posterior third; other portions of the mesonotum rather thickly clothed with golden yellow scales. Pleura thickly clothed with silvery white scales. Scutellum rather thickly clothed with long golden yellow scales, and with a conspicuous median and smaller lateral apical groups of long golden yellow setae; post scutellum smooth, dark brown. Halteres, apical portion slightly fuscous, basal semi-transparent, whitish. Abdomen dark brown with distinct basal yellowish white bands, slightly prolonged laterally. Terminal lobes fuscous. Ventral surface suffused with yellowish white scales. Coxae brownish yellow, rather thickly clothed with whitish scales; legs brown, unbanded. Femora and tibiae yellowish white ventrally; tarsi dark brown, claws unidentate. Wings with costa and first longitudinal vein thickly clothed with purple-brown scales, sub-costa and other veins more sparsely ornamented; fringe of a purplish grey. Petiole of the first sub-marginal cell about two-thirds the length of the cell; that of the second nearly as long as its cell. Posterior cross-vein a little over its own length from the mid cross-vein.

Habitat.—Elizabethtown, New York.

Time of appearance.—May.

Larva about three-eighth inch long. Antennae stout, slightly swollen at base, gently curved and tapering gradually to a blunt apex, tuft at the basal third consisting of about four apparently simple hairs. Tip with one long segmented apical process, a shorter, much more slender one, a stout long process and a considerably stouter, short one. Surface ornamented with rather large, stout, somewhat isolated spines. Labial plate triangular with about 25 fine teeth. Comb of 16 scales in triangular patch, each with a spatulate enlarged base, coarsely and rather sparsely setose on the sides, and with a stout sub-apical and a rather long apical spine, the latter as long or longer than the body of the scale. Air tube stout, about three times as long as broad, tapering gradually to the tip. Pecten of two rows of 20 to 24 dentate spines in each, each tooth with one large and two or three smaller denticulations."

It resembles the larva of *C. aurifer* but can be told by the antennal tuft being at the basal third, instead of beyond the middle as in *aurifer*.

Observations.—Described by Felt from a single freshly bred ♀.

Felt places this in his genus *Culicelsa* of which *taeniorhynchus*, Wiedemann, is the type. The description reads as a very diffe-

rent insect to Wiedemann's and it is doubtful if it can be placed with it.

CULICELSA ANNULIROSTRIS. Skuse (1889).

Culex annulirostris. Skuse.

Proc. Linn. Soc. N. S. Wales, p. 1737 (1889), Skuse; Mono. Culicid. I., p. 365 (1901) and III., p. 162 (1903), Theobald.

Dr. Bancroft has found that this species oviposits in "rafts."

CULICELSA VIGILAX. Skuse (non Theobald) (1889).

Culex vigilax. Skuse (non Theobald).

Culex marinus. Theobald (1901).

Proc. Linn. Soc. N. S. Wales, p. 1731 (1889), Skuse; Mono. Culicid. I., p. 396 (1901) (*marinus*), and III., p. 178 (1903), Theobald.

Dr. Bancroft writes me that this species oviposits singly.

Both Dr. Bancroft and myself find that the species I took to be Skuse's, *vigilax*, is not so and must be given a new name, whilst the other closely related species I described as *marinus* is the true *vigilax*.

For the former species I propose the name *pseudovigilax*.

Additional locality.—Johnstone River, N. Queensland (Dr. Bancroft).

CULICELSA PSEUDOVIGILAX. nov. nom.

Culex vigilax. Theobald (non Skuse).

Mono. Culicid. I., p. 395 (1901).

The species I took to be *vigilax* is not so. I therefore propose the above name as it is closely related. It seems to be rare, whilst Skuse's species which it closely resembles is very common.

CULICELSA ALBOANNULATA. Macquart (1850).

Culex alboannulatus. Macquart.

Dipt. Exot., p. 10, 4th Supp., Macquart (1850); Proc. Linn. Soc. N. S. Wales, p. 1732 (1889), Skuse; Mono. Culicid. I., p. 389 (1901), and III., p. 175 (1903), Theobald.

Dr. Bancroft writes me that this species oviposits singly. It comes in this genus, not *Culex* proper.

Genus **CULISETA.** Felt.

Mosq. N. York State, Bull. 79, Ent. 22, N. Y. St. Mus., p. 391(e) (1904), Felt.

Felt forms a new genus for his *Culex absobrinus.*

I have been unable to work out the two included species to see if any marked squamose characters occur, so give Felt's definition verbatim. The male genitalia are very marked, the claspers being noticeably short.

"Petiole of anterior fork-cell of ♀ about one-half its length. Posterior cross-vein less than its own length from mid cross-vein. Scales very large, lateral ones slender, linear; vein scales closely appressed, frequently elongated. Male wing with petiole of first fork-cell one-half to two-thirds the length of the cell, and the posterior cross-vein about its own length from mid cross-vein. Basal clasp segment of male genitalia triangular, apical segment slender, nearly straight. Claspette represented by a conspicuous basal lobe with one or more large, chitinous spines. Harpogones recurved, with several apical teeth. Larvae with pecten prolonged into setae and with stout, spined, comb scales."

Felt included in this genus besides the type his *magnipennis*, which is *consobrinus*, Rob.-Desvoidy, and *incidens*, Thoms. The latter is a *Theobaldia.*

Culiseta absobrina. Felt (1904).

Culex absobrinus. Felt.

Mosq. N. York State, Bull. 79, Ent. 22, N. Y. St. Mus., p. 318 (1904).

Head yellowish-white to creamy with dense black upright scales; proboscis deep brown. Thorax rich brown, a median line of black scales, with a few golden ones bordering it and ending in the same. Similar sub-median lines with a creamy eye-like spot about the middle of each and ending posteriorly in pale scales. Abdomen deep brown with basal creamy bands. Legs deep brown with pale knee spots.

♀. Head deep brown with narrow-curved pale creamy scales, more pronounced and paler at the sides and around the eyes, lateral flat scales creamy yellow, numerous thin black upright forked scales on the occiput; proboscis deep brown; palpi brown with scattered pale scales; antennae black with dark hairs and paler internodal pubescence.

Thorax deep rich brown clothed with very small narrow-curved brown scales somewhat larger, scantier and more irregular on the median line, with a few pale golden ones on each side, ending anteriorly in a pale golden mass of scales and also behind around the bare space in front of the scutellum; also traces of a sub-median line, which has about the middle a mass of pale creamy scales forming two more or less distinct spots and ending posteriorly in creamy scaled lines; pale scales also present around the front of the mesonotum, the median and sub-median lines with black chaetae (these lines show more prominently with a hand lens than under the two-third power); chaetae black; scutellum brown with narrow-curved creamy scales and brown border-bristles; metanotum brown; pleurae brown with pale flat scales.

Abdomen deep blackish-brown with basal creamy-white bands and pale golden hairs and border-bristles; venter mostly pale creamy scaled.

Legs deep brown with bronzy reflections, apex of femora and tibiae yellow and also base and under surface of femora; ungues equal and simple, rather large.

Wings with the lateral vein scales very thin, but dense, fork-cells rather short, the first sub-marginal longer and narrower than the second posterior, its base very slightly nearer the apex of the wing, its stem about half the length of the wing; stem of



Fig. 156.
Wing of *Culiseta abnobrina*. Felt. ♀.

the second posterior cell more than half the length of the cell, which is widened towards the edge of the wing; mid cross-vein in front of the supernumerary and the posterior a little behind the mid almost in a line with the supernumerary; halteres with pale stem and dusky apex.

Length.—6·5 to 7 mm.

♂. Palpi brown, unbanded, without hair-tufts, the two end segments not swollen, long, of about equal length; thorax and abdomen as in the ♀. Ungues of fore and mid legs unequal, the larger bi- the smaller uniserrate, posterior ones equal and simple.

Wings with the first sub-marginal longer and much narrower than the second posterior cell, its base nearer the apex of the wing, its stem about two-thirds the length of the cell; stem of the second posterior not quite as long as the broad cell; super-

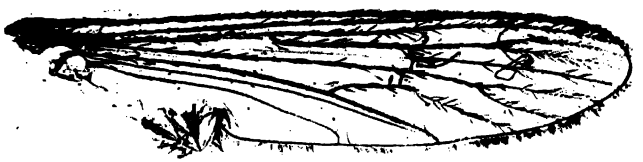


Fig. 157.
Wing of *Culiseta absobrina*. ♂. Felt.

numerary and mid cross-veins meet at an angle, posterior a little behind the mid. Genitalia with basal lobe thick, stout, hairy; claspers slender, uniformly curved.

Habitat.—Elizabethtown, Sarawac, New York.

Time of capture.—July and August.

Larva.—"Antenna stout, curved, with a thick well-developed tuft of plumose hairs at its basal third, and a pair of long slender spines on the apical fifth, in addition to one long spine and two rudimentary tapering processes at the apex. Labial plate sub-triangular, with twenty rather fine teeth, basal portion with distinct rather coarse reticulations. Comb of a triangular patch of sixty scales arranged in five irregular rows, each scale with a brown basal, somewhat spatulate enlargement, and terminated by an expanded, nearly colourless tip, bearing a series of rather fine sub-equal, apical spines, smaller spines on each side down to the base. Air tube four times as long as wide, with two rows of pecten at the basal fifth, each consisting of about fourteen closely set teeth bearing at their bases one or two conspicuous processes."

Found by Professor E. P. Felt in a cold mountain pool.

Observations.—This species is redescribed from specimens sent by Professor Felt. The thoracic adornment differs in the ♀



Fig. 158.
Culiseta absobrinus.
Comb scale.

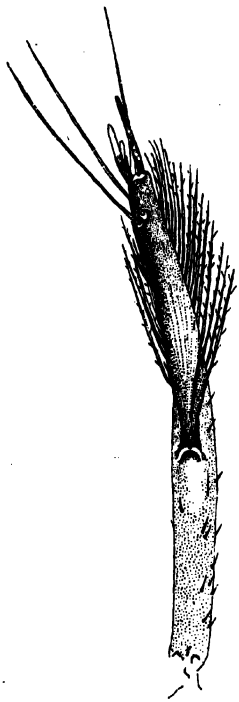


Fig. 159.
Larval antenna of *Culiseta absobrina.* (After Felt.)

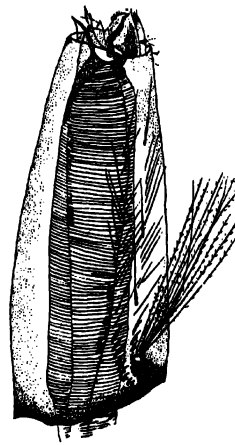


Fig. 160.
Culiseta absobrinus.
(After Felt.)

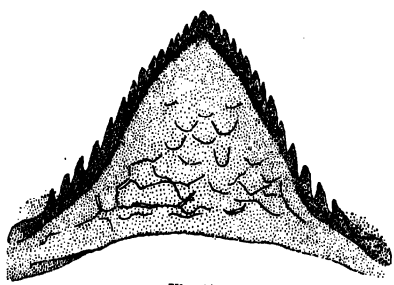


Fig. 161.
Labial plate of *C. absobrina.* Felt. (After Felt.)

described from his description in having two very pronounced pale eye-like spots on the mesonotum, but others only show traces of them. The thoracic adornment at once separates it from all

other *Culicidae* I have seen from America. The thin wing scales at once exclude it from *Culicada*, and Felt places it in his genus *Culiseta* which is adopted here.

Genus **CULEX**. Linnaeus.

This large unwieldy genus has now been much reduced by excluding a number of species and placing them in separate genera. Two of these genera (*Culiseta* and *Culicelsa*) seem to be formed on very slight characters and can scarcely be given any definite squamose characters. Felt's genitalic characters do not seem definite enough in all cases, and the venation is too variable to take with any degree of seriousness. As squamose characters are not sufficiently marked in these cases reliance for generic distinction must, I feel sure, be placed on the palpi of ♂ and ♀ if they are to be kept separate.

Taking *Culex pipiens* as the type of the genus *Culex* we find a peculiarity in the male genitalia, namely, the foliate lateral plate on the prominence of the basal lobe.

As far as I have been able to examine specimens microscopically only those with this character are now included here in *Culex* proper.

The species all present a great similarity. Previous characters given founded on *pipiens* and *fatigans* may be taken as the generic characters here adopted.

Culex vishnui. Theobald (1901).

Mono. Culicid. I., p. 355 (1901) and III., p. 161 (1903).

♂. The male genitalia have been isolated in this species from specimens sent me by Dr. Christophers.



Fig. 162.
Wing of *Culex vishnui*. ♀. Theobald.

The clasper is very much curved and expanded, with a small lateral terminal segment; the basal lobe is moderately long, contracted abruptly at the apex just below the later process which bears three long broad spines, the first the shortest, the other two slightly curved at the apex, then three more uniform shorter spines and a foliate plate which ends acutely.

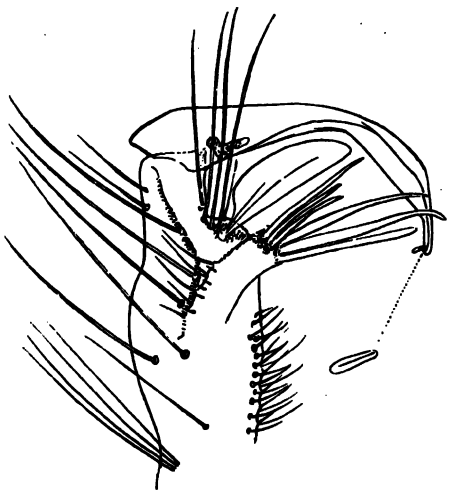


Fig. 163.
Male genitalia of *Culex vishnui*. Theobald.

The two apical segments of the palpi are equal in length, and with very scanty hair-tufts, a few long hairs also at the apex of the antepenultimate segment on one side.

CULEX ANNULIFERA. Ludlow (1903).

Journ. N. Y. Ent. Soc. Vol. XI., p. 141 (1903).

Head with dark brown and light scales, two bands of white on the sides; proboscis with a broad median pale band. Thorax dark brown, with curved creamy and white, irregular, indefinite lines and spots.

Abdomen dark, with basal white bands and traces of white lateral spots. Legs basally pale banded on some of the segments.

"♀. Head covered with dark brown and light scales, two bands of white flat scales at the sides, curved creamy and dark forked scales on the occiput, a narrow white rim around the eyes, and a few brown hairs between the eyes; antennae brown, verticels and pubescence brown, but giving pale reflections, first segment testaceous; palpi brown with small white apex, with a very broad creamy-coloured band, equal to one-half or more the length of the proboscis, between; eyes brown.

Thorax dark brown, covered with dark brown curved scales, with curved white and creamy scales in irregular and indefinite lines and spots; scutellum dark brown with cream-coloured curved scales, hairs brown;

metanotum dark brown; pleurae dark, with numerous patches of white scales.

Abdomen covered with very dark (almost black) scales and basal white bands, sometimes extending as small lateral spots; ventrally largely white scaled with apical white spots on many of the segments. The abdominal markings vary in definiteness in individuals, but the dorsal bands and the ventro-lateral apical spots seem persistent, while the very small dorso-lateral spots are not.

Legs; coxae and trochanters all more or less white scaled; femora all dorsally dark brown, heavily sprinkled with white scales, white or creamy knee spot sometimes involving both sides of the segment, ventrally much lighter; tibiae all dark, slightly sprinkled with white, and sometimes on the fore and mid legs, a narrow white ring at the apex; all first tarsals dark with narrow basal light bands, and that on the hind leg somewhat heavier, and sometimes a few light scales scattered through the dark ones; second and third tarsal segments on fore and mid legs have narrow light basal bands; fourth and fifth segments dark, sometimes a very small basal spot on the fourth; all tarsal segments on hind legs with heavy basal white bands. Fore and mid ungues equal, uniserrate; hind equal and simple.

Wings heavily brown-scaled; cells small; first sub-marginal narrower than and the same length as second posterior, the bases of the latter well interior; the stems of both nearly equal to the length of the cells; supernumerary cross-vein two-thirds the length of the mid cross-vein which it meets, posterior cross-vein is as long as the mid-vein, and distant from it more than its own length. Halteres light, knob white scaled.

Length.—6 mm., with proboscis 9 mm.

♂. Head much as in ♀, except that the second pale band on the sides is not so defined, and is perhaps lacking (♂'s not in good condition); antennae are really brown, but the reflections make them look ochraceous; palpi dark, with a white spot at the bases of the ultimate and penultimate segments, and a cream-coloured band dividing the remainder in halves, the plumes are rather heavy and dark, but like those of the antennae, often look mostly light; proboscis very dark, with quite a narrow cream-coloured band somewhat caudal of the middle (on a line with the anterior band of the palpi). Thorax as in the ♀, but very hairy. Claspers large.

Legs as in the ♀. Fore and mid ungues very unequal, the larger having a large tooth about midway, and a short, apparently spinous, one at the base; hind ungues equal and simple.

Wings not so heavily scaled, and the first sub-marginal a little longer than the second posterior, their bases nearly on a line; the posterior cross-vein a little shorter than the mid, and not quite its own length distant.

Habitat.—Mangarin and Dagupan, Philippine Islands.

Time of capture.—February to April.

Observations.—The ♀ described from a lot (28) sent by Dr. Frank Suggs from Mangarin, Mindoro; the males from a lot (234) sent by

Dr. M. A. De Lavey, from Dagupan, Pangasinan, Luzon, but the insects had many of them been wet, and were not in good condition."

(This species is very close to my *Culex microannulatus* and *Culex vishnui*.—F. V. T.)

Culex birói. Theobald (1905).

Ann. Mus. Nat. Hung. III., p. 82 (1905).

Proboscis with a median yellow band. Head with rather long pale scales. Thorax brown, unadorned, with narrow-curved golden scales. Abdomen brown, with basal pale bands and white lateral spots. Legs with narrow basal pale bands to the tarsal segments of the fore legs, all, except the last, on the mid legs.

Wings with the fork-cells long, the stems very short.

♀. Head brown, with rather long narrow-curved pale creamy scales, dark brown upright forked scales, and small flat creamy scales at the sides; clypeus dark brown; palpi black scaled; proboscis deep brown with a yellow band towards the apical half; antennae deep brown.

Thorax brown, with narrow-curved golden scales, which become paler before the scutellum, with brownish bristles over the roots of the wings; scutellum very large, brown, with narrow-curved pale golden scales and brown border-bristles; metanotum pale brown; pleurae tawny. When denuded the mesothorax shows two dark median lines and a curved one on each side.

Abdomen deep brown, with basal white bands, basal white lateral patches and creamy venter.

Legs brown, pale at the base and on under side of the



Fig. 164.
Wing of *Culex birói*. ♀. Theobald.

femora; the fore legs with narrow yellow bands to all the tarsal segments, that on the last tarsal indistinct or absent; mid legs

with the banding less distinct and on the hind legs more so; ungues all equal and simple.

Wings with typical *Culex*-scales, the fork-cells long; the first sub-marginal cell considerably longer and narrower than the second posterior, its base nearer the base of the wing, its stem about one-fourth the length of the cell, stem of the second posterior less than half the length of the cell; posterior cross-vein about twice its own length distant from the mid. Halteres dusky.

Length.—3 mm.

♂. Palpi deep brown, with narrow yellow basal bands on the two apical segments and with pale areas basally; hair-tufts



Fig. 165.
Wing of *Culex birói*. ♂. Theobald.

dark brown; the dark apical segment acuminate; antennae brown with broad grey bands between the verticels.

Thorax and abdomen as in the ♀.

Fore and mid ungues unequal, uniserrated, hind equal and simple.

Length.—3·3 mm.

Habitat.—Bombay (Biró, 1902).

Observations.—Described from three ♀'s and three ♂'s. They are closely allied to *Culex vishnui*, Theob., but can at once be told from it and others of the allied species by the much greater length of the first sub-marginal cell and by the head adornment which resembles that of *Culex microannulatus*, Theob. There is, however, a general different appearance, and their small size also separates them from the latter. In *C. vishnui* the first sub-marginal cell is nearer the apex of the wing than that of the second posterior and not nearly as long as in Biró's specimens from Bombay.

Culex kellogghi. Theobald (1903).

Canad. Entomo. Vol. XXXV., No. 8, p. 211 (1903).

Thorax brown, with rich reddish-brown scales showing linear arrangement, two small pale spots, some rows of grey scales

behind and on the scutellum. Proboscis black, with a white band. Abdomen black, with basal white bands and lateral spots. Legs black; femora pale at base, with a line or row of spots, also the tibiae with a line of white spots. First and other tarsals showing apical and basal white banding; last hind tarsal with a black median band or all white. Wings unspotted.

♀. Head brown, clothed with narrow-curved grey scales in the middle and behind, white ones forming a border around the eyes, brown ones between; at the sides small flat white scales, in the middle numerous upright forked ones, laterally they are black; two long brown bristles project forwards between the eyes. Palpi black-scaled, with some large white scales at the apex, and some forming a ring near the base; proboscis black with a white band; antennae black, basal and second segments dark testaceous, the basal segment with white scales internally; clypeus brown.

Thorax brownish-black with rich reddish-brown narrow-curved scales and a few broader grey ones at the sides in front, and some arranged in lines behind the mesonotum. On its surface are two pale spots, two of the posterior white lines being continued back from them. Two short broader ones are situated in front of the bare space before the scutellum. The reddish-brown scales have a linear arrangement, due to two prominent median bare lines; scutellum brown, with narrow-curved pale scales and brown border-bristles; metanotum deep brown; pleurae brown with grey scales.

Abdomen black, with basal white bands and white lateral spots; venter yellowish-brown with scattered grey scales.

Legs black, banded, striped and spotted in lines with white; base of femora grey to dull ochreous, pale beneath, with a row of white spots above, almost forming a line; apex white; fore and mid tarsal segments with narrow apical and basal yellowish bands, except the last tarsal segment; in the hind legs the tarsal segments have broad, almost white bands, the last tarsal in some specimens being almost all white; ungues equal and simple.

Wings with the veins very densely scaled with typical *Culex* scales, those at the base of the third long vein thicker, forming a small, rather obscure, dark spot; first sub-marginal cell longer and considerably narrower than the second posterior cell, its base slightly nearer the base of the wing, its stem about one-third the length of the cell; posterior cross-vein not quite its

own length distant from the mid cross-vein ; fringe dark brown ; halteres testaceous, knob darkened.

Length.—5 to 5·5 mm.

♂. Palpi brown, the last two segments nearly as long as the antepenultimate, the penultimate slightly shorter than the apical ; long brown hairs on each side of the last two segments and on the apex of the antepenultimate on one side ; a narrow pale band at the base of the last two segments and also near base of the antepenultimate ; proboscis black with a narrow white band at base of the apical half. More grey scales on the head than in the ♀. Thorax, abdomen and legs as in the ♀. Ungues of fore and mid legs unequal, both uniserrated ; hind equal and simple.

Length.—4 to 5·5 mm.

Habitat.—Stanford University, California (Professor Kellogg) ; Jamaica (Dr. Grabham) ; Benecia Barracks, California ; Fort Duchesne, Utah ; Fort Logan, Colorado ; Fort Nisbrara, Nebraska ; Fort Reno, Okla ; Texas ; Idaho ; Huntingdon, Tennessee ; Fort Missoula, Montana ; Rock Island, Illinois ; Fort Snelling, Minnesota ; Washington (Miss Ludlow).

Time of capture.—September and October (Kellogg) ; June (Grabham).

Observations.—Described from a series sent me by Prof. Kellogg. A marked species bearing some resemblance to *C. taeniorhynchus*, but has apical and basal leg banding, and with lines and spots of white. It also has simple ungues in the ♀, and the ♂ palpi also differ. It is not nearly so compactly built. The specimens show variation in regard to thoracic ornamentation and leg markings. One ♀ has no signs of the two thoracic spots, and the last hind tarsus of one is almost all white. In others it is almost all dark coloured. Coquillett considers it his *Culex tarsalis*, but he does not refer to the marked leg ornamentation.

The larva of C. kelloggii.—Head bright testaceous ; eyes black, a black band behind ; antennae black at the apex, acuminate, ending in three long black spines and one very small one ; just above the junction of the dark and pale areas is a fan-shaped set of hairs. Thoracic hairs as follows : the frontal band composed of two large median triple hairs, a couple of small ones next, then two single ones, followed by two triple ones outside ; the next lateral area composed of two outer densely compound groups, then on the inside a double and single hair ; third area composed of two compound bunches. The siphon as long as the

three preceding segments, pale testaceous, black at the apex and with a black basal ring and black spot, a row of small bristles on its basal half and a line of fine hair-tufts on the apical portion, these are four in number; at its base three tufts of bristles on each side and a group of spines; anal segment with a few long black dorsal bristles and pale ventral fan; gill plates long and narrow.

Length.—8·5 to 9 mm.

This species was bred by Dr. Grabham from larvae with long siphons. Five males and one female were sent me, but some of the ♂'s are smaller than the type, one only 4 mm. long.

CULEX TARSALIS. Coquillett. 1896.
Culex. n. sp. Williston. 1893.
Culex willistoni. Giles. 1900.
Culex affinis. Adams. 1903.

Canad. Entomo., p. 43 (1896) (*tarsalis*); North Ameri. Faun. 7, p. 253 (1893) (n. sp.), Williston; Hndbk. Gnats, 1st ed., p. 281 (1900) (*willistoni*), Giles; Kansas Uni. Sc. Bull, p. 25 (1903) (*affinis*), Adams.

The above is the synonomy given by Coquillett of this species in the "Canadian Entomologist" for 1904 (p. 261).

With regard to *affinis* of Adams, this seems correct, and Coquillett's description of *tarsalis*, which is the same as Williston's *n. sp.*, antedates Giles' *Culex willistoni*.

I have not seen Coquillett's type of *tarsalis*, if it answers the description of *kelloggii* then, I suppose, the latter must sink as a synonym; if it *is* the same, Coquillett missed out the most marked character, namely, the very prominently spotted legs, and no one could ever identify the species from his description. If the legs are spotted in *tarsalis* then it is doubtful to place Adams' *affinis* as a synonym, in which no mention is made of the spotted legs.

These are probably two species, and unless one has a full description of *tarsalis* it is best to leave *kelloggii* distinct.

This is recorded from British Columbia (Dr. Dyar) and Fort Baker, California (Miss Ludlow); Mississippi (Glenn Herrick).

CULEX HIRSUTIPALPIS. Theobald (1901).

Mono. Culicid. I., p. 379 (1901).

A single female from El Obeid in Kordofan sent by Dr. Balfour. It is quite typical, but does not show the two pale thoracic spots seen in most specimens.

This *Culex* was originally described from Mashonaland; it also occurs commonly in the Transvaal, Gambia, Gold Coast, and is probably existing all over Africa.

The thorax is brown covered with deep golden-brown scales, and some pale creamy ones, the latter usually form two more or less distinct spots on the mesonotum, there are also paler scales in front of the scutellum, over the roots of the wings, three rows of black bristles, and many over the base of the wings. The proboscis is deep brown at the base and towards the end, the middle forming a broad pale band, the extreme apex is testaceous.

The abdomen is brown with basal semi-circular median yellow patches and basal lateral white spots.

The legs brown, the segments with apical and basal pale bands, except the last tarsal in the fore and mid legs, which are all dark brown. Ungues in female all equal and simple. In the male the proboscis has a narrow median pale band; the palpi are brown longer than the proboscis by nearly the last two segments, apical segment acuminate with a narrow yellow apical band, and a broad basal one, the penultimate segment also with a basal yellow band, the ante-penultimate with a broad pale band and a narrow one towards its base, hair-tufts on the last two segments and the apex of the ante-penultimate long and black; fore and mid ungues unequal, both uniserrate, hind equal and simple.

The Sudan specimen measured 5·5 mm.

CULEX STENOETRUS. n. sp.

Head dull creamy yellow, with a dark patch on each side; proboscis deep brown; palpi brown, apex pale. Thorax rich brown, paler in the middle with a grey curved patch on each side in front of the roots of the wings. Abdomen deep brown, with four basal white bands. Legs deep brown, with basal pale bands.

♀. Head deep brown, with large narrow-curved pale golden scales, becoming much smaller in front, a large patch of flat

black scales at the sides, and flat creamy ones beyond, upright pale brown forked scales; brown chaetae projecting forwards, except between the eyes where they are pale golden; proboscis deep brown; palpi deep brown, with creamy scaled apex. Eyes coppery red.

Thorax deep rich brown, with brown and pale creamy almost pale grey scales, the latter form two curved irregular areas in front of the wings and to some extent at the sides and in front of the scutellum; chaetae brown and golden, those over the roots of the wings golden at the base, dark apically; scutellum brown, with narrow-curved pale scales and six or seven brown chaetae to the mid lobe; metanotum brown; pleurae brown, with patches of creamy scales. In some lights the thorax shows a dark patch at the root of the wings and a paler median area.

Abdomen deep blackish-brown, the second to fifth segments with basal white bands, the sixth with a few white scales, remainder unbanded; the first has a median patch of basal white and apical black scales and pallid brown hairs; venter mostly pale scaled.

Legs brown, femora pale ventrally and mottled with pale yellow scales, yellow at apex; femora deep brown with pale bristles; first tarsals deep brown, with basal creamy bands and pale bristles; second and third tarsals of fore and mid legs with narrow basal yellowish pale bands, all the segments on the hind legs with them; ungues equal and uniserrate.

Wings with yellowish brown scales, the fork-cells short, first sub-marginal a little longer and narrower than the second posterior, their bases about level; both stems about two-thirds the length of the cells; posterior cross-vein shorter than the mid, about one and a half times its own length distant from it; halteres ochreous.

Length.—5 mm.

Habitat.—Maskeliya, Ceylon (E. E. Green).

Time of capture.—April.

Observations.—A very marked species coming near *C. taeniorhynchus*, Wiedemann, in general appearance, and may possibly come in the same genus, but with adorned thorax, and markedly narrowed abdomen which has only four white basal bands.

CULEX SECUTOR. Theobald (1901).

Mono. Culicid. II., p. 321 (1901); Mosq. Jamaica, p. 22 (1905).

Geographical distribution.—So far only recorded from Jamaica. It is an inland species, and is recorded from Cinchona and Mavis Bank, between 3,500 and 5,000 feet altitude; a few stray specimens have been taken by Dr. Grabham in the Red Hills and in Kingston.

Life-history and habits.—This inland species appears in great numbers at certain times, especially after heavy autumnal rains. Great numbers bred in the pools at the foot of the Red Hills near Kingston in the autumn of 1899. The adults have a slow

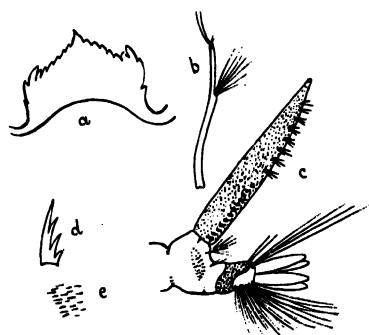


Fig. 166.
Larval characters of *Culex secutor*. Theobald.
a, Labial plate; b, antenna; c, siphon and anal segments; d, scale from siphon comb; e, scales on 8th segment.
(After Grabham.)

and clumsy flight and appear in clouds following one about. The following is Dr. Grabham's description of the adult larva :—

"Respiratory siphon many times longer than broad; double row of pecten consisting of twelve, four- to five-toothed spines, six to eight small hair-tufts at the upper posterior aspect of the tube.

"Lateral comb of simple short spines forty to sixty in number, arranged in a triangular patch; a large nine-branched tufted hair at the foot of the siphon behind. Chitinous collar completely encircling the ninth segment, saddle shaped; ventral tufts of hairs spring from a narrow prolongation backwards of the collar. Anal papillae three-fourths the length of longest ventral hairs, lanceolate, blunt at free ends. Dorsal tuft of six hairs, two of

great length. Thoracic hairs plumose. Lateral antennal tuft of numerous hairs at the junction of upper and lower thirds."

Economic importance.—This *Culex* is a persistent and vicious biter, and follows one about in dense clouds. It bites during the day and causes painful swellings.

Culex quasisecutor. n. sp.

Thorax deep brown with small dull golden-brown scales, collected into two paler spots, with a somewhat pale scaled line extending backwards from them, and traces of pale scales in front over the head, two median short basal lines as in *secutor*. Abdomen deep brown, with basal pale bands. Legs deep brown with prominent apical and basal pale banding to the hind legs, just traces of it on the fore and mid legs. Proboscis unbanded in the female, banded in the male.

♀. Head deep brown with pale grey narrow-curved scales in the middle with creamy reflections, duller at the sides, but smaller and brighter around the eyes, lateral area with flat creamy scales, numerous black upright forked scales especially dense at the sides and with brown chaetae in front; palpi rather long, deep blackish-brown, proboscis and clypeus deep blackish-brown.

Thorax brown with narrow-curved scales dull golden in some lights, bright bronzy in others, an area of darker ones on each side in front and around the bare space in front of the scutellum some of a similar colour, the scales collect in two denser patches towards the middle of the mesonotum forming two not very prominent pale spots, and they are somewhat denser in a line from each running backwards, and in some specimens the pale scales collect in front over the head to form two spots; as in *secutor* there are two short anterior median parallel bare lines of a dark brown; chaetae brown; scutellum paler than the mesonotum with paler scales of a golden hue, and six deep brown bristles to the posterior border of the mid lobe; metanotum bright brown; pleurae pale brown, with grey sheen and patches of rather long flat white scales.

Abdomen deep brown, with basal pale creamy bands, and basal lateral pure white spots and short, pale, golden border-bristles, and some pale golden lateral bristles. The bands on the third to fifth segments most prominent.

Legs deep brown, femora pale grey at base and beneath, in the

fore and mid legs there are traces of pale bands to some extent involving both sides of the joints, but mainly apical, more prominent on the mid than fore, in the hind legs the bands are very prominent, and the apex of the last hind tarsal is pale; ungues small equal and simple; knee spot prominent.

Wings with the first sub-marginal cell longer and narrower than the second posterior cell, its base slightly nearer the base of the wing, its stem about one-half the length of the cell;



Fig. 167.
Wing of *Culex quasisecutor*. ♀. Theobald.

stem of the second posterior cell about two-thirds the length of the cell; posterior cross-vein longer than the mid, sloping backwards, and not quite twice its own length distant from it; halteres pallid.

Length.—4·5 to 4·8 mm.



Fig. 168.
Another wing of *Culex quasisecutor*. ♀. Theobald.

♂. Palpi acuminate, the two apical segments brown, unbanded, the apical one longer than the penultimate, both with scanty black hair-tufts; the ante-penultimate with a broad creamy band near the apex, and a smaller one towards the base and traces of a still further basal one; proboscis with traces of a pale median band. Fore and mid ungues, unequal, uniserrate.

Wings with the first sub-marginal cell much longer and narrower than the second posterior cell, its base slightly nearer the base of the wing than that of the second posterior, its stem

rather more than half the length of the cell, stem of the second posterior cell as long as the cell; posterior cross-vein about two and a half times its length distant from the mid cross-vein. Genitalia with broad, curved claspers, terminal segment slightly expanded apically; the lateral process on the basal lobe with

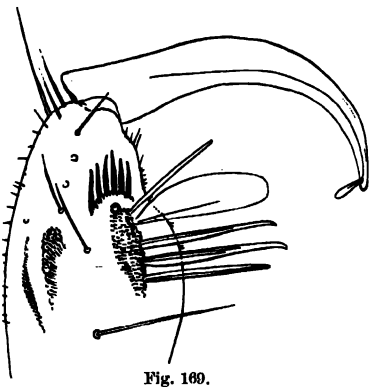


Fig. 169.

Male genitalia of *Culex quasisecutor*. Theobald.

three sword-like bristles and a foliate plate; a comb-like plate of six dark teeth close to the basal process, between it and the clasper.

Length.—4·3 to 4·5 mm.

Habitat.—Newcastle, Jamaica, W.I. (Dr. Grabham).

Observations.—Described from several ♀'s and two ♂'s sent by Dr. Grabham.

It was at first supposed to be *Culex secutor*, but can at once be told by the two pale spots on the thorax, the more prominently banded abdomen and by the apical segment of the male palpi being longer than the penultimate, not the same length as is the case in *C. secutor*. Otherwise strongly resembling *secutor*. It also resembles *Culex janitor*, Theobald, but this species has unbanded abdomen in the female, and the male palpi have the two apical segments equal, and there is only one pale band.

The larvae, Dr. Grabham writes, are very different from those of *C. secutor*.

CULEX ? ATROPALPUS. Coquillett (1902).

Canad. Entomo. XXXVI. p. 292 (1902), Coquillett; Journ. N. Y. Ent. Soc. X. p. 195 (1902); Proc. Ent. Soc. Wash. V. p. 144 (1903), Dyar; Mosq. N. Jersey, p. 260 (1905), Smith.

Head brown, with white scales and black ones at sides; proboscis black, long and slender.

Thorax golden-yellow scaled, with broad central blackish stripe.

Legs black, with white bands involving both sides of some of the joints, last hind tarsal white.

Abdomen purplish black, with basal white bands.

"♀. Head black, covered with whitish scales and a patch of black ones on each side which sometimes mix with those of the top.

Proboscis long, black, slender. Palpi black, fourth segment small, oblong, with an obtuse apex and one or two long bristles; antennae brownish black.

Thorax covered with golden yellow scales, and with a blackish central stripe which becomes diffused in the posterior portion; pleura dark brown, with small patches of dirty-white scales.

Legs black, femora yellowish underneath except near the apex, extreme apex white. The tibiae and second and third tarsal segments of the hind legs white at both base and apex, fourth and fifth tarsal segments white at the base only, while the last segment is wholly white. In the front and mid tarsals the bands are much reduced, the second being the only one white at both ends, the others white at the base, becoming more or less obsolete on the last two segments. Ungues equal on all the legs, the fore and mid uniserrate, posterior simple.

Abdomen purplish-black, with whitish bands at the base of the segments, becoming broad at the sides until, beneath, it is wholly white; banding irregular and very narrow or wholly wanting on some segments.

♂. Palpi black, two-thirds the length of the proboscis, the two terminal segments less than half the length of the basal segment; a few short hairs towards the apex represent the fan-like tufts. Antennae dark brown, the segments ringed with white and the plumes greyish-brown. Fore and mid ungues unequal, the larger biserrate, the smaller uniserrate, hind equal and simple.

Abdomen banded more broadly than in the female.

Length.—3·5 to 4·5 mm.

Habitat.—Maine, and New Hampshire, and along the Potomac River, Maryland, U.S.A. (Dr. Dyar); Connecticut (H. L. Viereck)."

Observations.—The description is drawn up from Smith's (p. 261). I am not sure where to place it as I have not seen a specimen. The structure of ♂ palp described by, and the long thin proboscis as figured by Smith seem to preclude it from *Culex*, and also the larval characters.

The habits of larvae, adult, etc., are partly taken from the same source as the description.

Habits of adults.—Dr. Dyar records it as very troublesome on and about the River Potomac and records its biting freely.

The *larva* varies from 7 to 9 mm. in length, pale greyish-white in colour except head, siphon, and ninth segment, which are

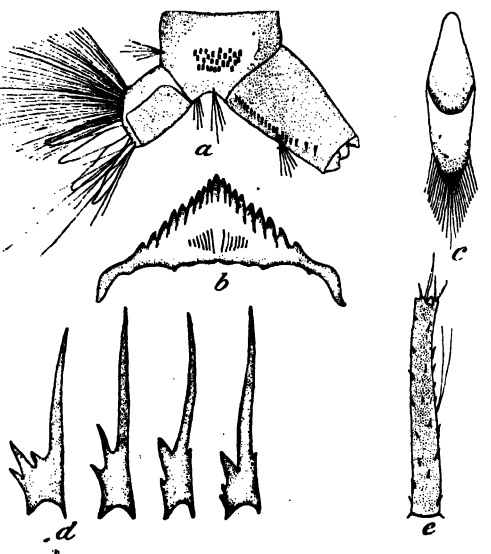


Fig. 170.

Culex atropalpus. Coquillett.

a, Siphon and anal segments; b, labial plate; c, scale of 8th segment; d, scales of siphon; e, antenna (Smith).

blackish-brown. Antennae rather short, brown, with a few thorn-like spines, apex with one long and three small bristles and a small articulated peg; lateral hair-tuft of two bristles, just below the middle; labial plate broadly triangular with 9 to

10 teeth on each side of apex, largest towards the base. Scales of eighth segment of from 28 to 35 in each patch, the scales with fine apical fringe; pecten of siphon of a double row of 17 to 21 spines; anal gills slender, a little longer than the ninth segment.

Dr. Dyar states that the eggs are laid in patches on the rock side of the pot holes where the larvae occur, usually at a time when the water is low, and they pass the winter in this condition. They hatch in March irregularly and grow slowly, the adults maturing late in April.

The eggs are black, elliptical, and coarsely reticulated. Those laid in spring hatch in three days. There are several broods. The larvae feed on green *Protococcus*.

CULEX SUBFUSCUS. n. sp.

Head brown, with pale scales, paler at the sides; palpi of male deep brown, a narrow pale band at the junction of the two apical segments, and the antepenultimate and a narrow one on the antepenultimate segment; hair-tufts brown and flaxen; proboscis with a pale band. Thorax rich brown, unadorned; scutellum paler. Abdomen deep brown, with basal pale bands. Legs deep brown, with very narrow apical pale bands. Apical segment of palpi longer than the penultimate.

♂. Head deep brown, with scanty narrow-curved pale creamy scales and brown upright forked scales, sides with flat creamy scales. Palpi deep brown, the apical segment longer than the penultimate, both with lateral deep brown (flaxen in some lights) hair-tufts, and a narrow pale band at the junction of the first two segments and at the junction of the penultimate and antepenultimate, also a narrow pale band on the long antepenultimate segment, which has long hairs on one side of its apex for some little distance; proboscis deep brown with a narrow pale band.

Thorax deep brown with narrow-curved rich brown scales, and three prominent double rows of bright brown chaetae and others at the sides, a few paler scales behind and over the roots of the wings; scutellum pale brown with narrow-curved pale creamy scales and eight bright brown to black posterior border-bristles and some smaller paler ones; metanotum deep brown.

Abdomen deep brown, basal segment brown, with two dark patches of scales, second segment with a median basal creamy

spot, other segments with basal creamy bands, pallid border-bristles and brown lateral ones.

Legs deep brown, femora pale beneath, knee spot creamy white, all the tarsal segments except the last with small apical creamy spots or bands; fore and mid ungues unequal, both uniserrate (?), hind small equal and simple.

Wings with short fork-cells, their bases about level, the first sub-marginal longer and narrower than the second posterior, the stems nearly as long as the cells; posterior cross-vein about twice its own length distant from the mid.

Male genitalia with the claspers fairly broad, not much curved, a small thin expanding lateral apical segment; lateral

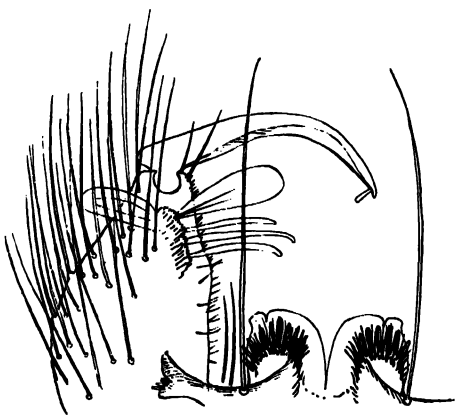


Fig. 171.
Male genitalia of *Culex subfuscus*. n. sp.

process of basal lobe with three large flat spines, the median one broadest and curved hook-like apically, the basal one the smallest, foliate plate rather short and broad; setaceous lobes large and prominent with many large broad spines and two broad flattish processes beneath them; basal lobes with very long chaetae.

Length.—5 mm.

Habitat.—Moncague, Jamaica (Lord Walsingham).

Time of capture.—February.

Observations.—Described from a single ♂. The genitalia mounted in balsam. It comes near *C. secutor* and allies in general appearance, but may at once be told by the apical segment of the palpi being longer than the penultimate, by the

narrow apical leg bands, and by the genitalia and unadorned thorax. The female is at present unknown.

Culex sylvestris. Theobald (1901).

Ecculex sylvestris. Theobald.

Mono. Culicid. I., p. 406 (1901), Theobald; Mosq. N. Jersey, p. 248 (1905), Smith; Bull. 79, Ent. 22, New York St. Mus., p. 289-293 (1904), Felt (*Ecculex sylvestris*).

Additional localities.—Generally throughout New Jersey State (Prof. J. B. Smith); British Columbia (Dr. Dyar); Connecticut (H. L. Viereck); New York State (Prof. E. P. Felt); Mississippi (Professor Glenn-Herrick).

Observations.—The following notes are compiled from Smith's report (pp. 250 to 255):—

"This species delights in porches and gardens, and does its share at the end of the season in making life miserable. It bites

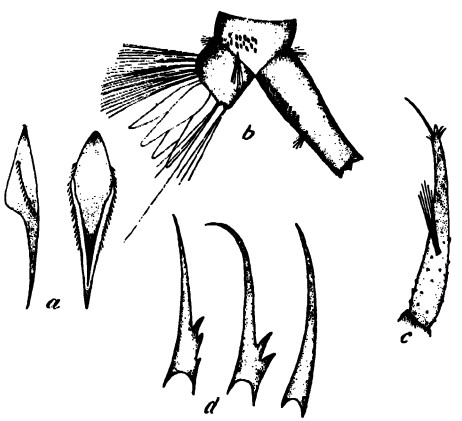


Fig. 172

Culex sylvestris. Theobald. (After Smith.)

a, scales of eighth segment comb; b, siphon and anal segments; c, antenna; d, siphon scales.

readily but not very viciously, the results not being very painful. It occurs throughout the season, but in small numbers early in the year. It is not a migrant like *sollicitans* and *cantator*, but may spread a mile or two and even five miles, but moves individually not collectively as the two former. It hibernates in the egg stage. The eggs are deposited singly on the surface of water and sink to the bottom, or they may be placed at the edge

of a low pool or in moist mud. The adult lives for weeks. The larva varies greatly in size (from 6 to 8·5 mm.); when full grown they are greyish or yellowish in colour, but when young almost white save for a yellowish head; antenna rather short, curved, thick at base, tapering apically; lateral combs of eighth segment with 10–12–15 scales each, arranged in a double row,

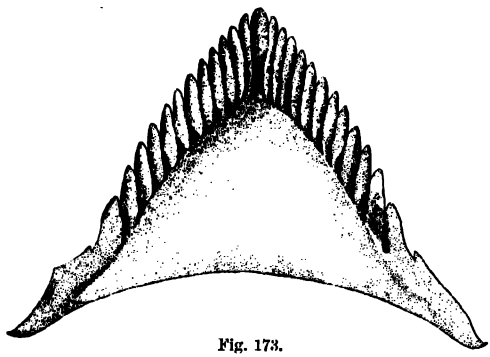


Fig. 173.
Labial plate of *Culex sylvestris*. Theobald. (After Felt.)

each scale is fringed at the sides with small hairs; pecten of siphon consists of two rows of 14–18 spines, varying as shown in the figure.

The larvae occur almost everywhere in New Jersey, except in salt marshes and foul water. Common with *C. canadensis* in woodland pools and in open swamps. Not all the eggs laid by one female hatch at the same time. Pupal stage two or three days."

CULEX ALBIPES. Lutz (1904).

Mosq. do Brasil, pp. 6, 41, 72 and 76 (1904).

"Length nearly 3 mm., without the proboscis which measures $1\frac{1}{2}$ mm.

Proboscis.—Long, with apex enlarged, dark violet coloured; the labellae yellowish, with black base.

Palpi.—Joints indistinct, yellowish at the base, with a white ring, apical half black, with one end yellow, some hairs at the base and some longer ones at the bottom of the base of the proboscis. Clypeus dull cream colour.

Antennae.—Dull yellow with whitish reflections, the large verticillate hairs dark, the small pale, both with a whitish shimmer.

Occiput.—Two golden hairs project forward, darker hairs behind. Scales fusiform, narrow-curved and cream-coloured; in the midst of these are a great number of others, erect, long, thin and bifurcated, appearing sometimes golden, sometimes dark. At the sides flat white scales which extend on to the head, where are also some hairs.

Prothoracic lobes.—Dark with rounded and narrow-curved scales, cream-coloured above, white below and long, thick dark hairs inclined towards the front.

Mesonotum.—Dark yellow, without the microscope; the ground colour is generally fawn-coloured with very dark patches; it has scales which sometimes appear to be nearly white, sometimes gold and sometimes dark and those on the sides chiefly black. Three bare lines and many dark chaetae with golden reflections.

Pleura shiny white and dark patches forming two narrow oblique lines which resemble those of *Culex pleuristriatus*; the scales are pearly white and many hairs are placed in rows running in the direction of the coxae. Green is to be seen shining through different parts of the thorax, chiefly soon after metamorphosis, etc.

Scutellum.—On the middle lobe on each side are three large hairs and the same number on the lateral lobes; besides these there are other smaller hairs and scales like those on the mesonotum.

Metanotum.—Large; with a pale colourless ground colour, dark at the sides.

Abdomen.—Flat above; first segment narrow, covered with light transparent scales and yellow hairs; from the second to seventh segments the dorsum is covered with black scales, over a colourless ground, with lateral pearly white patches; these spread out from the base without reaching the apex and variable in form, sometimes triangular, sometimes square, or half-moon shaped, but with irregular margins; pale scales prevail ventrally with pointed (? apical) dark bands.

Legs.—Dark with white rings; yellowish on the ventral side of the femora; the white rings are narrow and generally include the articulations. Last two hind tarsals yellowish white with some dark scales principally on the apex of the last and on the venter of the apex of the third, where they form nearly dark patches. In the mid legs the last two segments are lighter, owing to a great many transparent scales with a bronze sheen.

Wings.—First fork-cell about four times as long as the stem; the second about one and a half longer. Lateral scales long and narrow, grey; those in the middle wider, dusky bronze. The cross-veins a and b (supernumerary and mid) unite in an obtuse angle, open towards the base; the posterior cross-vein (c) is from 3 to 4 times its own length nearer the base of the wing.

Note.—Description of a female. Reared from a larva, caught in the bromelias (wild) at Itaprica (Bahia State) (Lutz)."

Culex niveitarsis. Coquillett (1904).

Culex nivitarsis. Coquillett (Blanchard).

Proc. Ent. Soc. Wash. VI., p. 168 (1904), Coquillett; Mosq. N. Jersey, pp. 227–231 (1905), Smith; Les Moust., p. 629 (1905), Blanchard.

Small (4·5 mm.) brown, first two fore and mid tarsals with pale bands involving both sides of joints; hind tarsi wholly white, except a faint dusky band in centre of three mid segments. Thorax brown. Abdomen with narrow white basal bands in ♀, broader in ♂.

♀. "Black, thorax and scutellum brown, first antennal joint, halteres, coxae, femora and tibiae yellow, the hind tarsi white and with a faint median brownish band on the three middle joints. Scales of palpi brown, those of the basal portion yellow, on the apex white; scales of the upper part of occiput golden yellow, on the sides and lower part chiefly white, those on the mesonotum golden yellow, on the abdomen purple, those on the extreme bases and front angles of the segments yellowish, including all on the seventh and following segments, those on the venter white. Scales of legs brown and whitish, not forming bands or spots; those on the first two pairs of tarsi brown and with white ones on the narrow bases and broad apices of the first two segments as well as on the narrow bases of the middle tarsi; scales of hind tarsi almost wholly white; all tarsal claws toothed. Wings greyish hyaline, the scales brown, lateral scales on the veins narrow and almost linear, petiole of the first sub-marginal cell about two-thirds as long as this cell; hind cross-vein about its own length (? distant from the mid.—F. V. T.).

♂. Palpi slender, black, a broad band at middle of first joint, and bases of the following segments white, proboscis reaching almost to apex of penultimate joint of palpi. Front and middle tarsi with one of their claws bidentate and the other unidentate, hind tarsal claws also unidentate; some of the brown bands on the hind tarsi quite distinct, especially the one on the third segment. Petiole of first sub-marginal cell almost as long as the cell.

Length.—4·5 mm. Otherwise as in ♀.
Habitat.—New Jersey (Grossbeck).
Time of hatching.—May 12th."

Observations.—Described by Mr. D. W. Coquillett from specimens reared by Mr. Grossbeck from larvae taken May 9th and 14th in rocky pools on Garrett Mountain, near Paterson.

The larva is described by Smith (pp. 229–231). It is stout

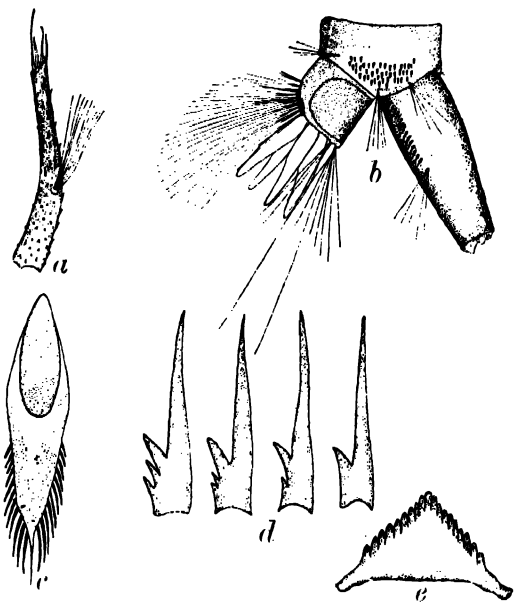


Fig. 174.
Culex niveitarsis. Coquillett.
a, antenna; b, siphon and anal segment; c, scale from comb of 8th segment; d, scales of siphon; e, labial plate. (After Smith.)

and robust, measuring 7 to 7·5 mm., greyish-white, profusely mottled and shaded with brown. Labial plate with nine blunt teeth on each side of apex; scales on eighth segment small, about 45 in each patch arranged in three or four irregular rows, form as shown in figure. Anal siphon yellowish-brown, about $3\frac{1}{2}$ times as long as broad, with spines of pecten 15 to 17 in number, broad at base with one, two or three spines, one always large. Anal gills long and bluntly pointed.

CULEX PALLIDOSTRIATUS. n. sp.

Head rich ochreous brown, slightly darker at the sides; palpi and proboscis bright ochreous, both dark at the apex. Thorax rich bright brown with two median nearly parallel pale scaled lines, and a similar coloured one on each side of the mesonotum and a median line not so pale as the others. Abdomen brown clothed with ochreous scales, the segments darker apically. Legs pale basally, femora and tibiae with black and yellowish lines, remainder brown, unbanded.

♀. Head pale brown, clothed with small pale golden narrow-curved scales, bright ochreous upright forked scales, dusky lateral flat scales and then cream-coloured ones; clypeus bright ochreous; palpi bright ochreous, a few pale apical scales and black chaetae, short and dense apically, giving a dark appearance; proboscis bright ochreous, except at the apex, where it is black, short black chaetae along the pale area; antennae pale with dusky bands, ochreous basal segment.

Thorax bright brown clothed with scanty *very small* curved scales of a rich golden brown, two median creamy lines nearly parallel, but just slightly diverging and then contracting in front, running from the front to the bare space in front of the scutellum, is a similar coloured line on each side of the mesonotum and just a fainter median line between the two pale ones, but the scales are similar to those of the golden brown areas, whilst the pale scales are slightly larger; chaetae golden or brown according to the light; scutellum pale ochreous, with pale narrow-curved scales and ochreous to golden border-bristles; metanotum bright ochreous brown; pleurae pale ochreous.

Abdomen clothed with rich ochreous scales, the apices of some of the segments appearing darker in some lights.

Legs pale at the base, femora and tibiae with creamy white and almost black lines; tarsal segments brown above, pale creamy below; fore and mid ungues equal, uniserrate, black; hind equal and simple.

Wings with rather short fork-cells, the first sub-marginal longer and narrower than the second posterior, their bases about level, stem of the former about two-thirds the length of the cell; stem of the latter about three-fourths as long as the cell; posterior cross-veins shorter than the mid, about its own length distant from it; halteres with pale stem and fuscous knob.

Length.—6 mm.

♂. Thorax with similar adornment but not so pronounced as in the ♀. Palpi ochreous, last two segments and apex of antepenultimate white scaled, with flaxen hair-tufts and some dark bristles, dense dark hair-tufts at apex of antepenultimate, a few dark scales at the apices of the segments; last two segments nearly equal, some prominent out-standing spines at the apex of the antepenultimate segment.

Abdomen with dark quadrilateral patches on the segments divided by a median dull ochreous line of flaxen brown.

Legs as in the ♀; fore and mid ungues both very unequal, both pairs uniserrate; hind equal (and simple?).

Wings with the fork-cells short, the first sub-marginal a little longer and narrower than the second posterior, its stem nearly as long as the cell, its base slightly nearer the apex of the wing;



Fig. 175.
Wing of *Culex pallidostriatus*. ♂. n. sp.

stem of the second posterior longer than the cell; mid cross-vein longer than the posterior which is less than twice its own length distant from the mid cross-vein.

Length.—6 to 7 mm.

Habitat.—Peradeniya, Ceylon (E. E. Green); India (Dr. Christophers).

Time of capture.—December (in Ceylon).

Observations.—Described from a female and two males. The thoracic adornment is so very marked, especially in the female, that the species cannot well be mistaken. There is evidently much variation in the abdomen, in the ♀ specimen it is all ochreous, in one ♂ there are two dark areas on most segments, in the other the dark areas are irregular and have many scattered pale scales. The ♂ palpi are also peculiar in their dense scaling and short thorn-like chaetae in addition to the hair-tufts.

CULEX DYARI. Coquillett (1902).

Culicella dyari. Coquillett.

Journ. N. Y. Ent. Soc. X., p. 192 (1902), Coquillett; Journ. N. Y. Ent. Soc. X., p. 199 (1902), Dyar; Les Moust., p. 364 (1905), Blanchard; Mosq. N. Y. Bull. 79, Ent. 22, p. 306 (1904), Felt, and p. 391c (*Culicella dyari*), idem.

Head deep brown, with a few pale scales in the middle; palpi and proboscis deep brown. Thorax rich brown, with scanty golden scales which are absent on two large median parallel stripes which do not extend quite to the scutellum and on two shorter lateral posterior areas.

Abdomen almost black banded with creamy yellow. Legs brown, apices of femora and tibiae yellow, many pale scales on the under side of all the segments.

♀. Head deep brown, with narrow-curved dull grey scales in the middle, dusky at the sides, then flat dusky scales, numerous thin dark upright forked scales; chaetae black; palpi deep brown, with long dark chaetae and fine pale hairs, apical segment very minute, penultimate long, antepenultimate small; proboscis black; clypeus black, with an apparent median longitudinal sulcus; antennae deep brown, almost black, basal segment brown, base of second segment and top of basal one pale testaceous.

Thorax deep rich brown, with a darker median line and sides, ornamented with scales of two forms, ordinary narrow-curved ones and very minute curved ones, the former pale golden, the latter dull brown; the larger curved scales form a median line on the median dark surface, branching out on each side of the bare space in front of the scutellum, a curved line on each side starting in front of the wings, others forming an indistinct line over the base of the wings and filling up the anterior lateral areas, the spaces between the pale scales at the base of the wings looking like two rich brown nude areas similar to the two long median areas, but in reality they have very minute dull curved scales sparsely scattered over the surface; scutellum deep brown, with narrow-curved pale golden scales and dark border-bristles, arranged on the mid lobe in two patches, two smaller hairs separating them; metanotum black; pleurae deep brown (nude in specimen described).

Abdomen black, with basal creamy bands and pallid border-bristles.

Legs blackish-brown, apex of femora and tibiae creamy and the ventral surface of the segments including tarsi with grey scales, seeming to be of irregular arrangement; ungues equal and simple.

Wings with typical deep brownish-black *Culex* scales; first sub-marginal cell considerably longer and slightly narrower than



Fig. 176.
Wing of *Culex dyari*. ♀. Coquillett.

the second posterior cell, its base very slightly nearer the apex of the wing than that of the second posterior cell, its stem more than half as long as the cell, the stem of the second posterior cell nearly half the length of the cell; supernumerary and mid cross-veins almost in a straight line; posterior slightly longer than the mid, about its own length distant from it; halteres deep ochreous with fuscous and grey scales on the knob.

Length.—4 mm. to 4·8 mm.

♂. Palpi deep brown, a few golden hairs at base of apical segment, others dark brown, a pale apex to the antepenultimate



Fig. 177.
Wing of *Culex dyari*. ♂. Coquillett.

segment, and some white scales on its median area; the two last segments slightly swollen, the apical most so; the latter shorter than the penultimate. Ungues of fore and mid legs unequal, the larger in both biserrated, the smaller uniserrated, hind pair equal and simple.

Wings with short fork-cells, the first sub-marginal longer and narrower than the second posterior, its base nearer the apex of the wing than that of the second posterior cell, its stem as long as the cell, stem of the second posterior longer than the cell, which is expanded towards the border of the wing. Genitalia with sword-like claspers, with a very short apical segment; median process with one large curved black tooth, a small blunt one, and a small outer acute one.

Length.—4·8 mm.

Habitat.—New Hampshire, Center Harbor (D. W. Coquillett, Dr. Dyar); Nassau, New York (E. P. Felt); British Columbia (Dr. Dyar).

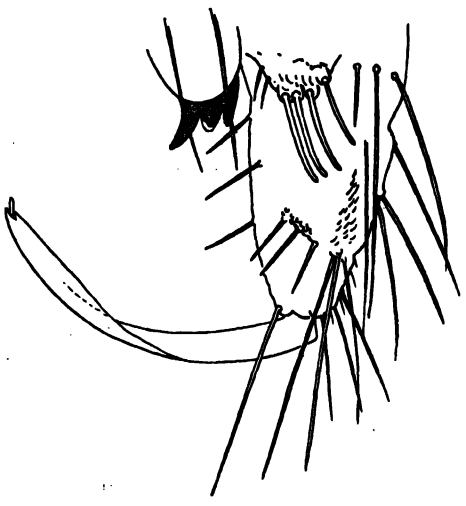


Fig. 178.
Male genitalia of *C. dyari*. Coquillett.

Time of appearance.—June (E. P. Felt).

Observations.—Re-described from a ♀ and two ♂'s sent by Professor E. P. Felt. It is a very marked *Culex*, told at once by the thoracic adornment. Mr. Coquillett says the tarsi are ringed basally, but in the specimens I have before me there is no true banding, the white scales being ventral; they appear the same in male and female and are irregular in disposition; however, there is no true basal banding to the tarsi in any of the specimens received.

Larvae were obtained by Dr. Dyar in a cold permanent spring

in New Hampshire and in a cold stream in the woods in British Columbia. The latter pupated on May 29th.

Dr. Dyar is of opinion that there is only an early spring brood.

The *larva* has a pale brown head and stout antennae, a tuft on the outer third and the part beyond smaller. Siphon four times as long as broad, tapering rather abruptly beyond the middle. Comb of over eighty scales in about ten rows. Professor Felt figures the labial plate with eleven teeth on each side of the apical one, the third and fourth from the base the largest and furthest apart. He places this species in a new genus, *Culicella* (Mos., N. Y., Bull. 79, Ent. 22, p. 391, c. (1902)). It is a typical *Culex* in all respects. The characters he gives for this genus are merely specific, and they are even variable ones, except those of the ♂ genitalia.

Culex corniger. Theobald (1903).

Mono. Culicid. III., p. 173 (1903).

A male recently given me by Dr. Lutz shows a variation in the thoracic adornment; the pale golden scales form a mass on each side in front from the inwardly projecting pale scaled area; the anterior pale areas have a brown central region.

The palpi are acuminate, brown, with large pale apex, then two narrow pale bands and a larger basal one; the last two segments and one side of the anterior part of the antepenultimate with prominent hairs, those on the apex pale, some pale ones at the first small pale band, rest deep brown.

Locality.—Santos, Brazil (Dr. Lutz), taken in June.

This species will probably have to be excluded from *Culex*.

Culex quasilinealis. n. sp.

Head with yellowish-brown scales, darker on each side. Thorax pale brown with two dull yellowish median parallel lines, dull yellowish scales laterally, and sending a dull yellowish curved line on each side to the median parallel lines, and thus enclosing two darker areas in front. Abdomen deep brown, with basal white bands and pallid border-bristles. Legs deep brown, unbanded.

♀. Head brown with narrow-curved pale creamy scales and pale flat lateral ones, deep brown upright forked scales behind,

paler brown ones in front and pale golden and brown hairs projecting forwards.

Palpi, proboscis and antennae deep brown.

Thorax deep brown to black with narrow-curved scales, two lines of pale dull yellowish ones in the middle, and similar coloured ones at the sides, sending in a curved line to meet the median ones, the spaces between forming two large oval areas of seemingly darker colour; chaetae dark brown; scutellum with similar scales and long dark brown chaetae to the mid lobe and lateral lobes; metanotum rich brown; pleurae ochreous, with some patches of pale flat scales.

Abdomen deep brown with basal white bands and pallid border-bristles; scales apparently ragged and not as closely compressed as usual.

Legs deep brown, femora paler at base and beneath; ungues equal and simple.

Wings short; the first sub-marginal cell much longer, but very little narrower than the second posterior cell; its stem short, about one-fourth the length of the cell; stem of the second posterior about two-thirds the length of the cell; upper branch of the fifth vein much curved upwards at its base; posterior cross-vein about three times its own length distant from the mid cross-vein; halteres entirely pale ochreous.

Length.—5 mm.

Habitat.—Adelaide (W. W. Froggatt).

Time of capture.—November.

Observations.—Described from a perfect ♀. The abdomen seems to be rather crumpled. The dark patch on each side of the front of the thorax seems to be partly due to shrinkage and light, as, under the two-third power, the thoracic scales look uniform. Skuse's *Culex linealis* probably comes near this, but the four distinct lines of golden scales with bare spaces between, described by Skuse in *linealis*, at once separate it.

CULEX PSEUDOMELANOCONIA. n. sp.

Head with dull golden brown scales; proboscis unbanded.

Thorax with golden scales and two median bare dark lines, the golden scales forming somewhat prominent lines on the sides of the bare spaces. Abdomen deep brown, unbanded, with golden border-bristles; pale scaled ventrally. Legs deep brown, unbanded.

♀. Head deep brown, with narrow-curved golden-brown scales in the middle, flat grey ones at the sides, with ochreous upright forked scales at the middle, dark ones at the sides, and flat grey ones laterally. Proboscis and palpi dark brown. Antennae and clypeus deep brown.

Thorax deep brown with narrow-curved golden scales, somewhat smaller over the humeral area, with two median bare lines showing as two dark areas; bristles brown, somewhat golden apically; scutellum brown, with golden narrow-curved scales; metanotum deep brown; pleurae greyish-brown to brown.

Abdomen deep blackish-brown with golden-brown lateral and posterior border-bristles; venter pale scaled.

Legs deep brown with violet reflections, bases of the femora pale, ungues small, equal and simple.

Wings with typical deep brown *Culex* scales, dense on the apical portions of the veins; the first sub-marginal cell much longer and slightly narrower than the second posterior cell, its base much nearer the base of the wing, its stem a little less than half the length of the cell; stem of the second posterior nearly as long as the cell; the posterior cross-vein much shorter than the mid, about twice its own length distant from it, the mid cross-vein the largest of the three.

Length.—3 mm.

Time of capture.—November.

Habitat.—South Queensland (Dr. Brancroft).

Observations.—Described from a single ♀. It resembles a *Melanoconion* in general appearance, but the wing scales are of *Culex* type. No other Australasian species has the unbanded abdomen and unbanded legs.

Culex restuans. Theobald (1901).

Mono. Culicid. Vol. II., p. 142 (1901), Theobald; N. J. Agri. Exp. Sta. Bull. 171, p. 16 (1904), Smith.

Additional localities.—New Jersey (J. B. Smith); Jefferson Barracks, Montana; New York; Massachusetts (Miss Ludlow); New Hampshire (Dr. Dyar).

Observations.—Professor J. B. Smith points out that the larvae of this species do not occur in foul water, but in rain-barrels.

It resembles generally that of *C. pipiens*, but the anal tube is different in shape and the antennae have a smaller tuft of hairs



Fig. 179.
Culex restuans. Theobald. (After Felt.) Pecten teeth.

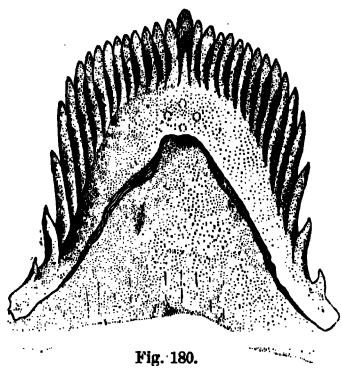


Fig. 180.
Labial plate of *C. restuans.* Theobald. (After Felt.)

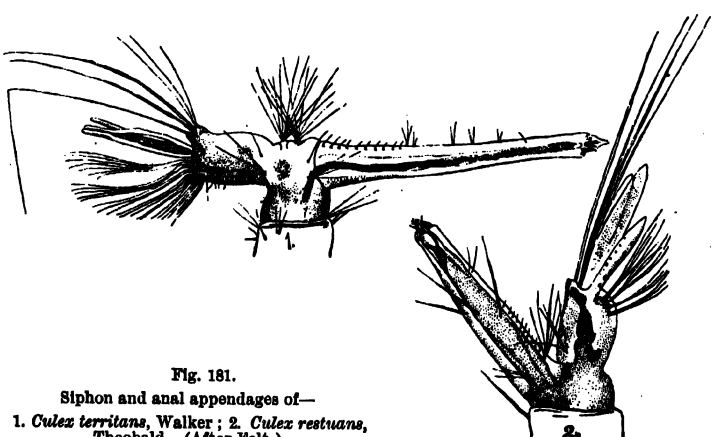


Fig. 181.
Siphon and anal appendages of—
1. *Culex territans,* Walker; 2. *Culex restuans,* Theobald. (After Felt.)

near the base. The labial plate is also seen to be very distinct (*vide* figures), each side has three or four teeth, the anterior margin with seventeen to twenty-three teeth in all evenly shaped.

The anal gills are long, not pointed, and with circular spots scattered over their surface.

The eggs are similar to those of *Culex pipiens*. No superficial differences can be detected in the egg rafts.

The larvae were found in the water of an ornamental vase as late as October in Lahaway in New Jersey by Mr. Brakeley.

CULEX STOEHRI. n. sp.

Head brown, paler in the middle and around the eyes; proboscis unbanded. Thorax brown, ornamented with rather dull golden-brown scales, and showing three darker longitudinal stripes on the basal half of the mesonotum, the middle the longest. Abdomen brown with basal creamy curved patches and a few scattered pale scales. Legs deep brown, unbanded.

♀. Head deep brown with narrow-curved pale creamy scales, especially dense around the eyes, with creamy upright forked scales in the middle, deep brown ones at the sides, and flat creamy lateral scales (the dark upright forked scales give the head a brown appearance when viewed with a lens). Palpi brown with scattered pale scales and a few long bristles basally; clypeus deep brown; proboscis deep brown, labellae pale; eyes coppery red and gold; antennae brown, basal segment paler, base of second segment bright ochreous.

Thorax deep brown clothed irregularly with golden narrow-curved scales, a narrow bare median line, scales paler at the sides and in front of the scutellum, the three darker areas seen with a hand lens do not show under the two-thirds power, but the scales there are fewer, narrower, and seem somewhat darker and differently disposed, chaetae deep brown to golden-brown, dense over the roots of the wings; prothoracic lobes large with narrow-curved pale creamy scales and similar hued chaetae to the mesonotum; scutellum deep brown with pale golden narrow-curved scales and deep brown border-bristles; metanotum deep brown; pleurae black with patches of small flat grey scales and groups of short pale golden hairs.

Abdomen deep brown with violet reflections, semicircular basal creamy spots and grey basal lateral spots; posterior border-bristles pale brown, venter mostly pale scaled.

Legs deep brown, unbanded; femora grey beneath, a small creamy knee spot, and a more prominent one involving the tibio-metatarsal joint; ungues equal and simple.

Wings with the first sub-marginal cell much longer and narrower than the second posterior cell, its base much nearer the base of the wing than that of the second posterior cell, its stem one-third the length of the cell; stem of the second posterior



Fig. 182.
Wing of *Culex stoehri*. ♀. n. sp.

cell about two-thirds the length of the cell; supernumerary and mid cross-veins not meeting exactly together, the posterior cross-vein longer than the mid, sloping backwards, and about twice its own length distant from it.

Length.—4·5 mm.

Habitat.—British Central Africa (F. O. Stoehr).

Observations.—Described from a perfect ♀. The thoracic adornment is very marked and characteristic when viewed with a hand lens, but this is not seen under the microscope; the three darker markings being due it seems to slightly more scanty scaling and the direction of the scales.

The thorax is very distinct from *C. fatigans*, which it closely approaches, the scales having a dull, in some lights almost fawn coloured shade.

Culex fuscocephala. n. sp.

Head deep blackish-brown, with traces of a very small pale median area; proboscis unbanded. Thorax uniformly dusky brown. Abdomen deep brown, unbanded, but the pale border bristles giving a quasi-banded appearance. Legs brown, unbanded.

♀. Head deep blackish-brown, with narrow-curved pale scales which are very scanty except in the middle line, so that the head appears dark; flat grey and creamy grey lateral scales

and numerous dark brown upright forked scales except in the mid line, chaetae brown; palpi slender and small, brown scaled, with black bristles; proboscis and antennae brown; basal segment and base of second segment of the latter paler.

Thorax dusky brown with two median dark lines and numerous small curved pale golden-brown scales and golden-brown bristles, the two dark lines have scantier scales than the rest of the mesonotum; the scales paler before the scutellum; scutellum paler than the mesonotum with paler scales and pallid border-bristles; metanotum pale greyish-brown; pleurae pale ochreous with some dark spots in a curved line above, one larger one below.

Abdomen brown, traces of some paler brown scales at the base of some segments, posterior border-bristles pale, giving a false banded appearance when viewed with a lens.

Legs brown, unbanded; femora pale grey beneath; ungues small, equal and simple.

Wings with typical Culex scales; the first sub-marginal longer and slightly narrower than the second posterior cell, its base nearer the base of the wing, its stem about half the length of the cell; stem of the second posterior cell rather more than half the length of the cell; posterior cross-vein sloping backwards about one and a half times its own length distant from the mid cross-vein.

Halteres with pale stem and expanded fuscous knob.

Length.—4 mm.

Habitat.—Peradeniya, Ceylon (E. E. Green).

Time of capture.—March and September.

Observations.—Described from two ♀'s. It is a somewhat obscure species, but may be identified by the fuscous appearance of the head, uniform coloured thorax and unbanded abdomen.

Culex salinarius. Coquillett (1904).

Ento. News, Feb. (1904), p. 73, Coquillett; Mosq. N. Y. Bull. 79, Ent. 22, N. Y. St. Mus., p. 332 (1904), Felt.

Head brown with ochreous and brown scales; palpi and proboscis deep brown; thorax rich brown with two median parallel bare dark lines; abdomen deep brown with or without basal pale bands. Legs brown with bronzy sheen, paler beneath. Ungues small, equal, and simple.

♀. Head brown with narrow-curved pale scales, numerous

pale broad upright forked scales in the middle and narrower dark ones at the side; clypeus pale brown; palpi and proboscis deep brown; antennae deep brown, basal segment paler brown.

Thorax brown with dense small narrow-curved golden scales, except for two parallel dark bare lines; scutellum brown with narrow-curved pale scales; those in front of the scutellum on the mesonotum also pale; metanotum pale brown; pleurae brown with a few patches of small flat grey scales.

Abdomen deep brown with basal creamy patches, almost bands, but sometimes absent; densely clothed with pale hairs; venter grey.

Legs brown with bronze reflections, the apex of femora pale, the under side of all the tarsal segments pale in some lights; ungues small, equal and simple.

Wings with long fork-cells, the first sub-marginal very much



Fig. 183.
Wing of *Culex salinarius*. ♀. Coquillett.

longer and slightly narrower than the second posterior cell, its base much nearer the base of the wing, its stem rather less than one-fifth the length of the cell, stem of the second posterior less than one-half the length of the cell; posterior cross-vein much longer than the mid, *nearly* twice its own length distant from it.

Halteres pale ochreous, with pale scales on the knob.

Length.—3·5 to 4 mm.

♂. Palpi very dark brown; a pale spot below at the penultimate segment; two last segments with black hair-tufts, and also a hair-tuft at the apex of the antepenultimate. Fore and mid ungues unequal and uniserrate; hind equal and simple.

There are now and then traces of pale scales on the apices of the abdominal segments as well as basal.

Length.—4 mm.

Habitat.—Sheepshead Bay, N.Y. (E. P. Felt); Newark Marsh, N.J. (J. B. Smith); Branford, New Haven, Connecticut (H. L. Viereck).

Time of appearance.—June (New Jersey, J. B. Smith), August and September (E. P. Felt).

Observations.—Redescribed from specimens sent by Professor E. P. Felt. Coquillett thought it was *Culex nigritulus*, Zetterstedt; I may be wrong, but the only species I could fix as Zetterstedt's was redescribed in vol. ii., p. 140, of this work; Coquillett evidently did not notice I did not mention in *nigritulus* the two dark bare parallel lines seen in his *salinarius*, which at once separates it from either *Culex pipiens* or *C. nigritulus*. It does not approach either in general form, but it bears some resemblance

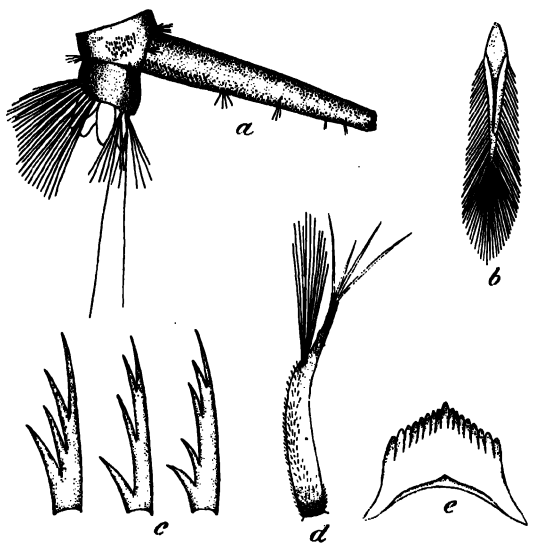


Fig. 184.

Culex salinarius. Coquillett.

a, Siphon and anal segment: b, scale from 8th segment; c, scales from siphon comb; d, antenna; e, labial plate. (After Smith.)

to *C. pipiens* in the very short stem to the first sub-marginal cell, which is, however, even smaller than in that well-marked species. It looks much more like Wiedemann's *fatigans* with the two dark bare thoracic lines, but can at once be told by the cephalic scales and the short stem of the first sub-marginal cell.

The male claspers are said to resemble those of *C. pipiens*.

Professor Felt says it is a smaller species than *pipiens*—I have had *pipiens* and had them from America quite as small; size is of *no* account in *Culicidae*.

Notes on life-history and habits.—It appears to be essentially a salt-marsh mosquito, and occurs in places alongside of *Grabhamia sollicitans.*

Professor J. B. Smith states that the larvae may occur anywhere on marsh land in New Jersey, in brackish as well as fresh water, and that it seems to prefer pools near the upland which are mostly formed by rains and springs working down from the highlands. It appears to hibernate in the adult state, and never gets far away from the edge of the salt-marsh. Professor Smith also states that the adults hide away in any shelter, but prefer cellars.

The eggs are laid in boat-shaped masses similar to those of *pipiens, fatigans,* and *nigritulus.*

Unlike marsh mosquitoes it is found in more permanent pools where other salt-marsh species are not found. The larva has been figured by Dr. Dyar (Journ. N. Y. Ent. Soc., XI., Pl. II., Fig. 3).

The head is sub-quadrate, and it has a long slender sub-anal tube.

According to W. D. Coquillett it resembles the larva of *C. territans,* from which it can only be distinguished by the spinous processes on the sub-anal tube having three or four branches instead of a single branch.

According to Professor J. B. Smith the larva may be recognised by its dirty white colour and the very long, moderately stout air tube. The labial plate is broadly triangular with eight teeth on each side. It has a double pecten, each tooth coarsely three spined and scattered hairs beyond. The comb consists of about forty narrow long-fringed scales in three rows.

Culex fragilis. Ludlow (1903).

Journ. N. Y. Ent. Soc. Vol. XI., p. 142 (1903).

Head dark, with pale ochraceous scales, paler around the eyes and sides; proboscis light brown. Thorax very light, with two dusky sub-median lines and a light greenish-brown tinge, with frosty tomentum as in *Anopheles,* with small fine golden hair-like scales; metanotum almost white; pleurae a soft blue-green. The whole thorax with a greenish tinge and translucent appearance. Abdomen dark green, with thin opalescent white scales. Legs pale unbanded.

"♀. Head dark, covered with light ochraceous, almost cream-coloured curved, and light fawn-coloured forked scales on the occiput, with white flat opalescent ones at the sides and a rim around the eyes; antennae light brown, pubescence and verticels the same; palpi light brown; proboscis light brown; *eyes dark blue.*

Thorax very light with two rather broad light-brown sub-median lines and a light greenish-brown tinge, covered with a frosty bloom much like that found on *Anopheles*, sparsely covered with very small hair-like golden scales. Scutellum light brown with similar scales; metanotum almost white, pleurae testaceous, a soft green-blue. The whole thorax has a greenish tinge and a general translucent appearance. Abdomen dark green sparsely covered with very thin white opalescent flat scales and light brown hairs; ventrally much the same.

Legs: coxae and trochanters coloured like pleurae, femora light fawn-coloured dorsally, white ventrally; tibiae much the same; all the tarsal segments rather darker—a light brown—the scales are all small and on these segments give golden reflections. Ungues small, simple and equal.

Wings covered with small fawn-coloured scales; first sub-marginal a little longer and nearly the same width as the second posterior, the stems of both about two-thirds the length of the cells; the supernumerary cross-vein the same length as the mid and about two and a half times its length distant. Halteres, light stem, fawn-coloured knob. The third long vein is extended into the basal cells by an incrassation nearly as heavy as that found in the *Desvoideae.*

Length.—3 to 3·5 mm.

♂. Differs from ♀ very slightly. Antennae a soft light brown and the tufts of the palpi are small and of the same general fawn colour; the thorax frequently lacks the two light sub-median lines, and is perhaps lighter. Ungues of fore and mid legs slightly uneven, the larger bearing a large tooth about midway.

Habitat.—Oras, Samar, Philippine Islands.

Time of capture.—August (6th) (Miss Ludlow)."

Observations.—This species described by Miss Ludlow is clearly very distinct. It comes nearest my ***Culex viridis***, and perhaps, as in that species, the green colour may be due to green algae in the body.

Culex bifoliata. Theobald (1905).

Journ. Eco. Biol. I., p. 31 (1905).

Head brown, with dull yellowish scales in the middle, a black patch on each side and grey laterally. Male palpi deep brown, with a narrow pale band at the base of each of the two apical segments and a broader pale one on the ante-penultimate segment. Proboscis unbanded. Thorax deep brown with paler

scales at the sides in front. Abdomen brown, with traces of pale grey basal banding. Legs brown, with very narrow pale bands involving both sides of the joints. Fore and mid ungues

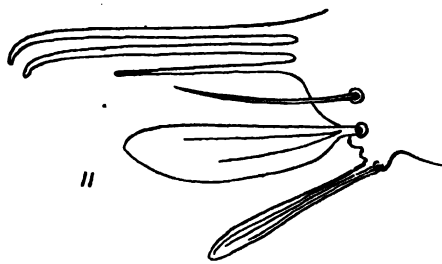


Fig. 185.
Culex bifoliata. Theobald.
Lateral process of basal lobe of male genitalia.



Fig. 186.
Male genitalia of *Culex bifoliata*: Theobald.

unequal, uniserrate, hind equal and simple. Male genitalia with two leaf-like plates on each process of the basal lobes.

This species closely resembles *Culex hirsutipalpis*, but is smaller and the male genitalia differs, there being two leaf-like plates to each side.

Length.—3 mm.

Habitat.—Transvaal (C. B. Simpson).

Observations.—Very marked and easily separated by the genitalia, which have two flat blade-like plates. The male only so far is known.

Culex trimaculatus. Theobald (1905).

Ann. Mus. Nat. Hung. III., p. 86 (1905).

Head with dull golden narrow-curved scales and dark upright forked scales. Thorax pale yellowish-brown, with a large median reddish-brown elongate triangular spot and another on each side behind; metanotum bright yellowish-brown. Abdomen brown, with pale (rather indistinct) basal bands spreading out laterally. Legs brown unbanded. Wings with scales of typical *Culex* form.

♀. Head brown, with small narrow-curved golden scales and numerous thin dark brown upright forked scales; proboscis rather short, brown; palpi and antennae brown.

Thorax pale yellowish-brown, with a median reddish-brown elongated triangular spot, the base near the head and another reddish-brown spot on each side at the back, covered with small scattered narrow-curved dull golden scales and numerous golden bristles over the roots of the wings; scutellum pale yellowish-brown with dusky narrow-curved scales on the mid lobe, paler ones on the side lobes; border-bristles pale golden, nine to the mid lobe; metanotum pale brown.

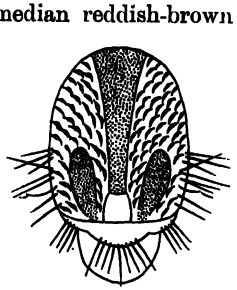


Fig. 187.
Thorax of *Culex trimaculatus*. ♀.

Abdomen dull brown, with basal dull yellow bands, which spread out laterally; in certain lights the abdomen looks dull ochreous.

Legs brown, paler basally; ungues of fore and mid legs uniserrated, hind equal and simple.

Wings with typical *Culex*-scales; the first sub-marginal cell a little longer and very slightly narrower than the second posterior cell, its base slightly nearer the apex of the wing than that of the second posterior; its stem about two-thirds the length of the cell; stem of the second posterior also about two-thirds the length of the cell; posterior cross-vein rather more than its own length distant from the mid cross-vein.

Halteres ochreous.

Length.—4·3 mm.

Habitat.—Bombay (Biró, 1902).

Observations.—Described from a single perfect ♀. It can be told from all other species of *Culex* by the very marked thoracic ornamentation, which resembles that of a *Corethra*.

Type in the National Museum, Budapest.

Culex tortilis. Theobald (1903).

The Entomologist, XXXVI., p. 281 (1903); Mosq. Jamai., p. 26 (1905).

Head golden scaled; proboscis unbanded; thorax adorned with golden scales and a large dark brown patch on each side in front, the back of the mesonotum also darkened; pleurae with grey scales. Abdomen deep brown, with violet reflections; the second, third, fourth and fifth segments with narrow basal pale bands; venter pale yellow scaled. Legs deep brown, unbanded; femora and coxae white beneath. Ungues equal.

♀. Head brown, clothed with narrow-curved golden-yellow scales, a few black bristles and ochraceous upright forked scales; proboscis and palpi deep brown; antennae brown; basal segment testaceous; second segment very large and swollen, deep brown.

Thorax deep brown, the middle of the mesonotum clothed with narrow-curved golden scales; on each side in front is a roundish deep brown patch and the posterior part of the mesonotum has darker scales than the front, being almost brown, but not so dark as the front lateral areas; scutellum with dull golden-brown scales and brown border-bristles; metanotum bright chestnut-brown; pleurae pale brown, with spots of grey scales.

Abdomen black in some lights, deep rich dull violet in others; the first segment with dusky scales, forming two spots and with pale golden hairs; the second, third, fourth and fifth segments with narrow pale yellowish basal bands, not extending quite across the segments; the fifth sometimes very inconspicuous; basal lateral white spots prominent on the apical segments; venter clothed with creamy-yellow scales; border-bristles of the dorsum pale golden.

Legs deep brown except the coxae and under side of femora which are grey to creamy-yellow; femora, tibiae and hind first tarsals with black bristles; hind first tarsals very nearly as long as the hind tibiae; fore and mid ungues equal, uniserrated; hind ungues equal and simple.

Wings clothed with typical brown *Culex* scales; fork-cells rather short; first sub-marginal cell very slightly longer, but narrower than the second posterior cell, its stem about as long as the cell, its base about level with the base of the second posterior cell, if anything slightly nearer the apex; stem of the second posterior cell not quite as long as the cell; posterior cross-vein very short, about twice its own length distant from the mid cross-vein; a pale spot at the base of the wing; halteres testaceous.

Length.—4 to 4·5 mm.

Habitat.—Kingston, Jamaica (Dr. Grabham).

Time of capture.—August.

Observations.—Described from a series of ♀'s taken by Dr. Grabham in 1903. They are very distinct, thick-set, small mosquitoes, easily told by the thoracic adornment; the two dark spots on the front of the mesothorax are very characteristic.

It, to some extent, resembles *Culex secutor*, Theobald and *C. janitor*, Theobald, but the unbanded legs at once separate them, as well as their much stouter build.

There is some variation in venation; a few specimens show the base of the first sub-marginal cell slightly the nearest to the apex of the wing and the posterior cross-vein is as long as the mid cross-vein and about its own length distant from it. In others the basal abdominal banding is very faint. In one there is a trace of an additional basal abdominal band.

When alive Dr. Grabham has noticed that they can at once be identified by the habit of carrying their hind legs twisted right forward over their head, when settled, after the manner of the *Wyeomyias* and *Dendromyias*. The male and the life-history are at present unknown.

Culex neavei. Theobald (1906).

Sec. Rept. Gord. Coll. Well. Labs., p. 76 (1906).

Head brown with a grey patch on each side; proboscis deep brown unbanded. Thorax adorned with rich golden-brown scales. Abdomen brown, unbanded, but the segments with few scales at their base giving a quasi-banded appearance, all the segments with basal lateral white spots. Legs brown, unbanded, the femora pale grey ventrally and at the base; the hind first tarsals and tibiae of equal length; wings of typical *Culex* form.

♀. Head brown, clothed with narrow-curved pale grey scales, amongst which are numerous upright black forked scales (the general effect being brownish when seen with a hand lens only), on each side a patch of flat white scales; clypeus, palpi and proboscis deep brown; antennae brownish-black, the basal segment paler with a few pale scales.

Thorax deep brown with narrow-curved golden-brown scales all sloping backwards with two more or less distinct parallel median bare lines, brown bristles which are numerous over the roots of the wings; prothoracic lobes with grey scales; scutellum pale brown with narrow-curved greyish scales and brown border-bristles; metanotum pale chestnut brown; pleurae pale grey with a few pale scales.

Abdomen pale greyish-brown covered with deep brown scales, which are thinly disposed at the base of the segments which thus present a faint false banding, basal segment pallid with two patches of dark brown scales from which arise two groups of short golden brown hairs which curve outwards and numerous longer pale brown hairs from the body of the segment; posterior border-bristles of irregular size, indistinct dull pale dusky brown; each segment has prominent basal white lateral spots.

Legs deep brown, unbanded, femora all pale grey below, the hind ones grey above at the base as well, apex of the femora with a pale grey spot; posterior first tarsals and tibiae of equal length; ungues all equal and simple.

Wings with typical brown *Culex* scales; the first sub-marginal cell considerably longer but only slightly narrower than the



Fig. 188.
Wing of *Culex neavei*. ♀. Theobald.

second posterior cell, its base slightly nearer the base of the wing than that of the second posterior cell, its stem more than one-third the length of the cell, stem of the second posterior cell about two-thirds the length of the cell; posterior cross-vein

nearly twice its own length distant from the mid; halteres with grey stem and fuscous knob.

Length.—4 mm.

Habitat.—Lualas; Lado (Sheffield Neave).

Time of capture.—January (28. 1. 05), and February.

Observations.—Described from three females all in perfect condition, one gorged with blood and quite black.

The species comes, near *Culex guiarti*, Blanchard, but can at once be told by the different wing venation, pale grey pleurae and from the next allied species by the hind metatarsi and tibiae being the same length.

One specimen shows the stem of the first submarginal cell slightly longer than the rest.

The scales on the basal lobe of the antennae I have not noticed before in any true culex.

The species appears to be common and may easily be confused with *C. guiarti* and the other allied species described here.

CULEX RUBINOTUS. Theobald (1906).

Sec. Rept. Gord. Coll. Well. Labs., p. 78 (1906).

Head brown with dull golden scales, creamy at the sides. Proboscis, palpi and antennae brown. Thorax bright reddish-brown with scanty narrow-curved blackish scales. Abdomen clothed with deep blackish-brown scales and with traces of apical creamy-white lateral spots, no basal bands. Legs yellowish-brown, clothed with dusky brown scales; hind first tarsals longer than the hind tibiae.

♀. Head brown with small narrow-curved dull golden scales, some rather long black upright forked scales and black bristles, pale creamy flat scales laterally; clypeus brown with an apparent median transverse sulcus indented in the middle; palpi densely scaled with deep brown scales and with numerous deep brown bristles, base testaceous, the scales being scanty; proboscis deep brown, swelling apically.

Thorax bright reddish-brown with scanty small narrow-curved blackish scales (somewhat denuded) and with black bristles; scutellum the same colour with similar dark scales, posterior border-bristles of the mid lobe six in number, three on each side with a wide median space; metanotum pale ochreous brown; pleurae pale ochreous with a few flat dusky scales and small curved black chaetae.

Abdomen clothed with deep dusky blackish brown scales with traces of apical lateral creamy spots; basal segment testaceous with a median patch of black scales from which proceeds a line of a few dull brown chaetae, numerous other longer ones proceed from the nude part of the segment; posterior



Fig. 189.
Wing of *Culex rubinotus*. ♀. Theobald. × 16.



Fig. 190.
Culex rubinotus. ♀. Theobald.
Showing variation in venation. × 12.



Fig. 191.
Denuded wing of *Culex rubinotus*. ♀. Theobald. × 12.

border-bristles dull golden brown, long at the sides, shorter in the middle; venter with many pale creamy scales.

Legs unbanded, yellowish-brown, covered with dusky brown scales, the ground colour showing through basally, ungues small equal and simple; the hind first tarsals a little longer than the hind tibiae.

Wings with the fork-cells rather short, the first submarginal

cell much longer and narrower than the second posterior cell, its stem more than one-third the length of the cell, its base nearer the base of the wing than that of the second posterior; second posterior cell wide, the branches slightly diverging at apex, its stem about two-thirds the length of the cell; cross-veins large, the mid longer than the supernumerary, about the same length as the posterior one, which is distant from the mid nearly twice its own length; scales at the apices of the veins somewhat broader than is usual in *Culex*.

Halteres with pale stem and fuscous knob.

Length.—3·8 to 4·5 mm.

Habitat.—Lualas, Sudan (Sheffield Neave).

Time of capture.—January.

Observations.—Described from several females. The species is very marked, the bright reddish-brown thorax contrasting strongly with the dark unbanded abdomen. The thorax in both specimens is slightly denuded, but what scales remain are distinctly black and small. The form of the second posterior cell is rather marked. One ♀ differs slightly in venation. (Fig 190). The abdomen shows very indistinctly apical lateral creamy spots. The female palpi are composed of four segments, the three basal ones are small, the apical one is as long as the basal three and ends bluntly; the apical segment is spinose, the penultimate has one long and several small chaetae, the antepenultimate has two long and some small ones.

CULEX GUIARTI. Blanchard (1905).

Culex viridis. Theobald (1903). non Rob.-Desvoidy (1827).

Mono. Culicid. III., p. 212 (1903); First Report Gord. Coll. Well. Labs., p. 73 (1904); Les Moust., p. 629 (1905), Blanchard.

A female and two males that resemble the type in all characters have been received from the Sudan. There are no structural differences from the type. They resemble specimens seen from Gambia and Uganda. The abdomen is unbanded, otherwise the species looks at first much like *Culex fatigans*, Wied., or *Culex pallidocephala*, Theob.

It has been recorded from Uganda, Gambia, Sierra Leone, and before from the Sudan (1st Report, p. 73). The pleurae are very green as described in the type. The colour was not due to verdigris showing through the pale grey pleurae as was at

one time thought; the rich green pleurae are very characteristic of the species. The female palp and second antennal segment show the difference between the two allied species mentioned and *C. viridis*, which I undoubtedly placed all as one in the First Report of the Gordon College Wellcome Research Laboratory, p. 73.

The specific name *viridis* was used by Robineau-Desvoidy in 1827, for a *Culex* that cannot be identified. Hence Blanchard has renamed this insect.

Culex pallidocephala. Theobald (1905).

First Rept. Gord. Coll. Well. Labs., p. 73 (1905).

Somewhat like *C. fatigans*, but the head has rather dense pale narrow-curved scales and numerous dark brown to black upright forked ones. Palpi and proboscis black. Thorax dark brown ornamented with brown and golden-brown narrow-curved scales, the golden-brown forming more or less distinct linear ornamentation and a curved line on each side in front of the wings, which surrounds a dark area in front of each wing. Abdomen black with basal creamy bands. Legs brown unbanded.

♀. Head brown, clothed with rather dense pale narrow-curved scales which lie uniformly pointing forwards, a few still paler very small flat scales laterally and long thin bifid upright forked scales over the greater part, those placed laterally jet black, those in the median area dark brown to yellowish-brown, according to the rays of light; palpi thick, three distinct small basal segments dull testaceous, the swollen apical segment as long as the three basal ones and black scaled; there may be a minute nipple-like apical segment, but if so it is hidden in scales; proboscis and clypeus deep brown.

Thorax dark brown, ornamented with dull golden and deep rich brown narrow-curved scales; the dark scales form two prominent oval areas, one in front of the base of each wing, the dull golden scales bordering them; the latter are also more or less placed in lines along the middle of the thorax and others at the sides above the pleurae, others, almost creamy, in front of the scutellum; scutellum paler brown than the mesonotum, with pale narrow-curved scales and black border-bristles, seven to the mid lobe; metanotum black; pleurae black with three patches of white scales.

Abdomen black with black scales and creamy basal bands, the last two spreading out laterally; venter all creamy yellow.

Legs deep brown, unbanded, traces of a pale knee spot and a creamy apical spot on the hind tibiae.

Wings with typical brown *Culex* scales; the first sub-



Fig. 192.
Wing of *Culex pallidocephala*. ♀. Theobald.

marginal cell considerably longer and slightly narrower than the second posterior cell, its base slightly nearer the base of the wing than that of the latter, its stem variable, from one-half to one-fourth the length of the cell; stem of the second posterior about two-thirds the length of the cell; posterior cross-vein rather more than its own length distant behind the mid cross-vein; halteres with reddish-brown stem, fuscous knob with a few grey scales.



Fig. 193.
Culex pallidocephala. ♀.
Apex of wing.

Length.—4·5 mm.

♂. Head deep brown, with narrow-curved grey scales with a median dividing line, numerous upright black and ochreous forked scales and some black bristles; palpi dusky-brown almost black along the two apical segments and on the apex of the antepenultimate, traces of a pale band (very narrow) towards the base; hair-tufts deep brown; proboscis deep brown, thin.

Thorax much as in the female, but the scanty ornamentation not so distinct; pleurae pale with indistinct patches of grey scales.

Abdomen deep brown, hairy, the segments with basal white lateral spots, the last segment with basal white band, posterior border-bristles pale golden, short, lateral hairs very long, golden-brown; basal segment testaceous with two prominent tufts of black scales; owing to scanty scaling the abdomen appears to be basally pale banded.

Legs deep blackish-brown, unbanded, the coxae and base and under side of femora creamy-white; a faint pale knee spot and a small spot at the apex of the tibiae. Ungues of the fore legs and mid legs unequal, both uniserrated, the larger fore ungues more curved than the mid, hind ones equal and simple.

Genitalia with broad flat claspers ending abruptly in a narrow portion, the foliate plate very broad and with longitudinal striae, three long flattened processes at the side, the middle one the largest, the third one the shortest; there is also a single spine bent like a fish-hook.

The two apical segments of the palpi of nearly equal length.

The vein scales on the apices of the veins rather broader than usual in *Culex*, first sub-marginal cell longer and narrower than the second posterior cell, their bases about level, stem of the first submarginal rather less than half the length of the cell, stem of the second posterior not quite as long as the cell; posterior cross-vein nearly twice its own length distant from the mid cross-vein.

Length.—4 mm.

Habitat.—Sennar, Blue Nile (Dr. Balfour).

Observations.—Described from a single female and three males. It resembles at first sight *C. fatigans*, but the paler scaled head and the numerous long upright forked scales separate it; the thorax too is distinctly ornamented, the two dark ocellate areas being most noticeable. The palpi may be five-jointed, but are heavily scaled so that a small apical segment cannot be seen; the three small basal segments are very distinct. The last tarsals are gone, so that the characters of the ungues cannot be given. The male genitalia are very marked, otherwise the male might be mistaken for *Culex guiarti*, Blanchard.

The pleurae are pale in the ♂; in the female the pleurae are dark, but the latter effect is undoubtedly due to the body being filled with blood.

The pale scaled head and scutellum should easily separate it without microscopic examination.

Culex dentatus. Theobald (1905).

First Rept. Gord. Coll. Well. Labs., p. 75 (1905).

Head dark brown with some narrow-curved golden scales, a golden-yellow border round the eyes and a pale patch on each side. Thorax deep brown, ornamented with rich golden-brown

and golden narrow-curved and hair-like scales showing more or less linear arrangement. Abdomen deep brown with basal pale bands and basal creamy lateral spots, venter creamy scaled. Palpi, proboscis, legs uniformly brown, except the under side of the femora, which are pale, and there is a yellow apical tibial spot; ungues large, equal, uniserrated.

♀. Head dark brown, almost black, clothed behind and over most of the mid area with large narrow-curved pale golden scales, almost creamy-yellow in some lights and with a frontal median patch of much smaller golden-brown ones, around the eyes thin narrow-curved pale creamy scales and flat pale creamy lateral ones; upright forked scales not much expanded apically, scanty and dark brown; a pale yellow tuft projects beneath the eyes; palpi thick, deep brown or black, with long black bristles; proboscis deep black; antennae deep brown, basal segment and base of the second segment testaceous, the former darker on the inner side with a few creamy scales. Thorax deep brown clothed with curved hair-like golden-brown and golden scales, the golden scales forming two rather indistinct median parallel lines and a curved lateral line on each side behind with a more or less darkened area outside it, before the scutellum the scales are paler and of normal curved form; scutellum brown with narrow-curved pale golden scales and brown border-bristles, seven to the mid lobe; metanotum brown; pleurae black with patches of creamy scales.

Abdomen black with basal creamy scaled bands and lateral spots, venter mostly creamy scaled; on the apical segment the creamy lateral spots join the basal band and look like extensions of it down the sides.

Legs brown, unbanded, but the femora are pale ventrally, and there are yellow knee spots and traces of apical yellow tibial spots; ungues all equal, thick and with a thick tooth.

Wings large and broad, scales of typical *Culex* form; first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing than that of the second posterior cell, its stem a little more than one-third the length of the cell; posterior cross-vein about half its length distant from the mid cross-vein; halteres with pale stem and creamy scaled knob.

Length.—5 to 5·5 mm.

Habitat.—Isana, through Damot, Abyssinia.

Observations.—Described from four females. It is a large

heavy built *Culex*, very like a large *C. fatigans*, Wied., but can at once be told by the dentate ungues. The thoracic ornamentation is marked in some very clearly, in others not so much.

A *Culex* sent by Dr. Balfour from the Sobat in very damaged condition seemed to be this species.

Culex inconspicuus. Grossbeck (1904).

Ent. News, p. 332, Dec. (1904); Mosq. N. Jersey, p. 295 (1905), Smith.

Brown; dorsal surface of thorax very dark brown, with pale yellowish scales at the sides defining the central stripe. Abdomen dark brown with basal grey bands. Legs and proboscis dark unbanded.

"Head dark brown, with many pale yellow scales scattered over occiput; proboscis and ♀ palpi dark brown, almost black, the former about

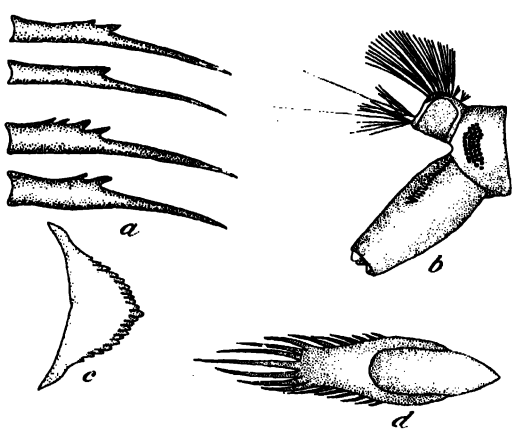


Fig. 104.

Culex inconspicuus. Grossbeck.

a, Scales of siphon comb; b, siphon and anal segment; c, labial plate; d, scale of 8th segment. (After Smith.)

half the length of the body. In the ♂ the palpi are evenly dark brown, slender, dilated apically and longer than the proboscis by the terminal and half of the penultimate segments. Antennae brown in both sexes, with the basal two joints in ♀ testaceous. The dorsum of thorax dark brown covered with pale yellowish scales at the sides, limiting a rather broad central stripe, which is more or less well defined; the shoulders are covered with brown scales, becoming diffused posteriorly in the yellowish scales. The pleura are brown with small spots of greyish white scales. The legs are wholly brown with the under side of the femora yellowish

white; the small dot at the knee almost imperceptible. Claws precisely as in *C. pretans*, those of the anterior and mid feet unequal, the larger with a median and basal tooth, the smaller with a single tooth nearer the base. Abdomen dark brown with basal bands of dirty white; in the female these bands are narrow and widen out laterally; beneath pale brownish with scattered white scales, especially noticeable in the apical segments; in the ♂ the bands appear darker, being mixed with some brown scales. They are narrow on the anterior segments, broader on the posterior and widen out laterally as in the ♀; beneath it is whitish with mixed brown scales.

Habitat.—Garnott Mountain, near Paterson, New Jersey, U.S.A. (Grossbeck; Smith)."

Observations.—This very distinct species was described by Mr. Grossbeck from bred specimens. Professor Smith states that "they were determined as *reptans* by Mr. Coquillett, but are undoubtedly different from the other specimens caught and bred and labelled with the same name." The larvae were found in a woodland pool; nothing is known of their habits, and the description is drawn up from exuviae only.

They resemble the larvae of *sylvestris*, but are much smaller. The labial plate has 10–12 teeth on each side of the apex; the siphon has 16–20 spines in each of the two rows, the spines are long and slender and have one or two teeth near the middle; the combs of the eighth segment large, 40–45 scales in each, each scale with three long apical spines and short lateral ones (J. B. Smith).

CULEX OSAKAENSIS. n. sp.

Thorax with dull golden yellow scales, brighter before the scutellum, with a darker wedge-shaped area on each side in front of the wings and two indistinct darker areas in front of them, the chaetae showing as two dark lines posteriorly on the brighter scaled area; traces of two median parallel bare lines in front; head slightly paler than the thorax. Abdomen deep brown with basal white bands. Legs brown, unbanded. Palpi of ♀ with mottled brown and white scales; of ♂ all dark brown.

♀. Head deep brown clothed with narrow-curved creamy scales, dark-brown upright forked scales, flat creamy lateral ones few in number and with dark brown chaetae surrounding the front of the head directed towards the middle of the head; palpi clothed with deep brown scales, *white scaled apically*; proboscis deep brown; antennae deep brown, basal segment pale on one side, base of the second segment pale testaceous.

Thorax deep brown, clothed with narrow-curved dull golden scales with two median parallel bare lines and with scantier rather darker scales on each side in front of the wings and another area on each side in front of these showing as darker areas with a hand lens, posterior part of mesonotum paler scaled than the rest, the two median parallel lines of deep brown chaetae showing up prominently; scutellum pale ochreous brown with narrow-curved creamy scales and rich brown border-bristles, eight to the mid lobe; metanotum brown, paler in places; pleurae pale yellowish-brown with patches of flat white scales.

Abdomen deep brown with basal white bands and pale creamy scaled venter; hairs pale.

Legs deep brown, femora and tibiae pale ventrally, hind tibiae with apical pale spot; ungues equal and simple.

Wings with the first fork-cell much longer, but very little narrower than the second posterior cell, its base nearer the base of the wing, its stem not quite one-fifth the length of the cell, stem of the second posterior *not half* the length of the cell; posterior cross-vein nearly twice its own length distant from the mid; lateral vein scales dense. Halteres pale.

Length.—6 mm.

♂. Palpi acuminate deep brown apically, considerably longer than the proboscis, the apical segment longer than the penultimate, both with brownish-black scanty hair-tufts, the two apical segments about two-thirds the length of the penultimate; antennae brown and white banded, plume-hairs brown, second and few following segments rather large. Fore and mid ungues unequal, both uniserrate, hind equal and simple.

Wings with the scales scantier and rather broader than the ♀; first sub-marginal cell longer and narrower than the second posterior, its base nearer the base of the wing, its stem less than one-third the length of the cell; stem of the second posterior three-fourths the length of the cell; posterior cross-vein twice its own length distant from the mid; the supernumerary cross-vein slopes at a prominent angle to the mid as in the ♀.

Genitalia with long narrowish basal lobes, bluntly acuminate, claspers short, curved and broadish, not half the length of the basal lobe; terminal segment short and rather broad; lateral process of the basal lobe with three large and broad spines, then three smaller ones, then the foliate plate, and then a single spine; the first large spine is thick and ends bluntly, sword-like, the second is longer, curved apically and tapering, the third is

much thinner than the other two, of the three smaller ones one seems larger than the other two but no longer; harpes small and



Fig. 195.
Male genitalia of *Culex osakaensis*. n. sp.

sickle-shaped; harpogones small, dark, claw-like; setaceous lobes sessile, with many spines on the apex and sides, of a black colour.

Length.—5·8 to 6 mm.

Habitat.—Osaka, Japan.

Observations.—Described from a series sent me some time ago through Mr. Cornford; the name of the collector has been lost.

This species was put on one side as *Culex fatigans*, but its general form seemed different, being larger and of a more straggling build. It differs in having white scaled ♀ palpi, in the male palpi being much longer than the proboscis, in the marked male genitalia and in the wing venation; the short stalk of the first fork-cell is noticeable at once, although variable, and the thorax shows definite but obscure ornamentation. The stalked setaceous lobes of the male genitalia are also very characteristic.

Culex simpsoni. Theobald (1905).

Journ. Eco. Biol. I., p. 28 (1905).

Head pale ochreous coloured in the middle, a dark area on each side and pale laterally. Proboscis brown, dark brown and

swollen apically. Thorax clothed with dull pale ochreous and reddish-brown scales giving a mottled appearance with two bare median parallel lines. The ornamentation consists of two reddish-brown spots in front, two long lateral, and one long median patch behind. Abdomen blackish with basal white bands. Legs deep brown with pale apical femoral and tibial spots. Ungues of female equal and simple, the fore and mid of the male unequal and uniserrate.

♀. Head deep brown clothed with narrow-curved pale scales and with small flat white ones laterally, in the middle are ochreous upright forked scales, at the sides numerous black upright forked scales, giving the appearance of two black patches when viewed with a hand lens. Clypeus brown. Proboscis brown, deep brown and swollen apically. Palpi deep brown. Antennae brown, basal segment pale fawn-coloured, slightly darker on inner side.

Thorax deep brown clothed with narrow-curved pale ochreous scales with two roundish patches of a rusty red hue in front and three longer patches behind, often somewhat indistinct in outline and giving a somewhat mottled appearance. When distinct the lateral hind patches are elongate and curved on the inner border and the median one is broad and long; in front arise two nearly parallel dark median bare lines broadest anteriorly and which disappear about the middle of the mesonotum; chaetae pale brown; scutellum with narrow-curved pale scales and six dark border-bristles to the mid-lobe; pleurae pale greyish brown with some patches of flat white scales.

Abdomen deep brown with basal white curved bands not extending quite across the segments; posterior border-bristles brown; apex rather hirsute.

Legs deep brown except the base and under side of femora which are pale ochreous, apices of femora and tibiae with a pale spot, most prominent on the hind tibiae, bristles of tibiae bright brown, of first tarsals black; ungues small, equal and simple.

Wings with the first submarginal cell considerably longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem rather more than one-half the length of the cell, stem of the second posterior cell as long as the cell; posterior cross-vein about twice its own length distant from the mid cross-vein.

Halteres with pale stem and dusky knob.

Length.—3·5 to 4·5 mm.

♂. Palpi black, with a narrow pale band towards the base, rather acuminate; last two segments and apex of the antepenultimate segment with scanty black hairs. Antennae with brown hairs, nodes black, internodes grey. Legs and abdomen as in the female. Fore and mid ungues unequal, the larger with a large outstanding tooth, the smaller with a short, acute, basal tooth; the hind claws small, curved, equal and simple.

Genitalia with long curved claspers with small dark terminal segment, and a prominent bunch of long flat sword-like bristles, four in number, arising from a prominence on the basal lobe,

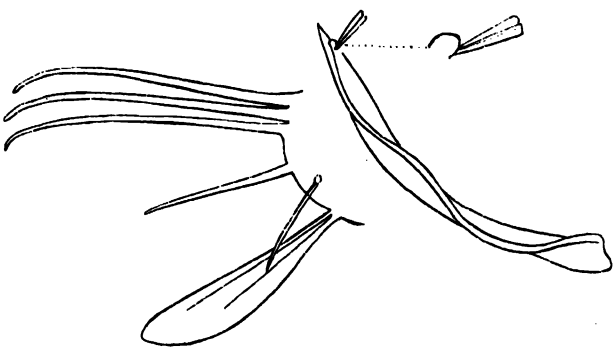


Fig. 196.
Culex simpsoni. Theobald. (♂ genitalia.)

three much longer than the fourth. The three long ones are curved at their apices; near this tuft is a single leaf-like plate pointed apically. The three long spines are not as long as the claspers.

Length.—3·5 to 4·5 mm.

Habitat.—Transvaal (C. B. Simpson).

Apparently very common. Very variable in size. Its chief gross characters are the thoracic ornamentation and the pale apical femoral and tibial spots. The thoracic ornamentation is not always distinct. In some the markings of rusty red are very clear, two roundish ones in front, and two prominent lateral elongated ones behind, and a median long broad one.

The female palpi are composed of three segments, the apical one very large, longer than the two basal ones, the basal the smallest.

The male genitalia are very characteristic, the bunch of flat bristles on the basal lobe being most marked; three being long and one short.

CULEX BOSTOCKI. Theobald (1905).

Journ. Eco. Biol. I., p. 29 (1905).

Head deep brown, with scattered golden scales; proboscis and palpi black, the former longer than the body. Thorax rich brown, with brown scales and some scattered dull golden ones, forming two indistinct lateral lines; scutellum with pale scales.

Abdomen black, the basal segments with narrow grey apical bands, and all the segments with pale lateral apical spots. Legs deep brown, except base and under side of femora and knee spots, which are pale.

♀. Head deep brown, with pale narrow-curved scales and long, black, upright forked scales, sides with small, flat, pale, ochreous scales, and a narrow border of curved grey scales around the eyes.

Proboscis long and thin, black. Palpi black. Clypeus black.

Thorax deep brown, clothed with narrow-curved brown scales and some scattered dull golden ones, which form two more or less distinct lines, which pass down to the front of the roots of the wings, and which spread across between the wings and around the bare space in front of the scutellum. On the denuded surface are seen two dark median parallel lines which shine through the scales (when held in some lights, the dark lines become pale silvery grey). Scutellum with narrow-curved pale yellowish scales and black border-bristles, seven of the latter to the mid lobe. Metanotum brown. Pleurae brown, with some small flat white scales.

Abdomen black, the second and third segments with traces of pale scaled apical borders, and all the segments with grey apical lateral spots; venter with grey apical bands, the basal segments with many scattered white scales; border-bristles pale ochreous, the two last segments with many pale hairs over their whole surface.

Legs deep brown, except the base and most of the under side of the femora; knee spots yellowish and a trace of a pale spot on the apex of the hind tibiae; hairs on femora, tibiae and first tarsals pallid; hind first tarsals about one-fifth longer than the hind tibiae. Ungues all equal and simple, very small.

Wings with the first sub-marginal cell longer and just a little narrower than the second posterior cell, its base nearer the base of the wing, its stem rather more than one-half its length; stem

of the second posterior cell not quite as long as the cell; posterior cross-vein long, about its own length distant from the mid cross-vein.

Halteres with pale stem and dusky knob clothed with dull grey scales.

Length.—4 mm.

Habitat.—Transvaal (C. B. Simpson).

Described from a single male. Easily told by the apical abdominal banding and lateral apical grey spots.

CULEX MINUTUS. Theobald (1905).

Journ. Eco. Biol. I., p. 30 (1905).

Thorax with golden scales, looking deeper reddish-brown at the sides with three parallel dark lines, metanotum pallid. Abdomen blackish-brown, with dull grey irregular basal bands and white lateral spots extending along nearly the whole length of the segments. Legs deep brown, with traces of small dull apical spots on femora and tibiae. Five spines on prominence of male genitalia, three being as long as the claspers.

♀. Head clothed with narrow-curved pale creamy scales and numerous black upright forked scales and small flat grey lateral ones.

Proboscis, palpi and antennae deep brown. Clypeus black, elongated, Thorax deep brown, clothed with pale dull golden narrow-curved scales, in some lights appearing dark (reddish-brown) at the sides and with three parallel dark bare lines, scales paler before the scutellum; scutellum greyish-brown, with narrow-curved pale golden scales; metanotum pale greyish; pleurae grey.

Abdomen deep brown, with irregular indistinct grey basal bands and large white lateral spots which seem to extend the greater length of some of the segments; posterior border-bristles long and pallid.

Legs deep brown, femora pale beneath, traces of pale spots at the apices of femora and tibiae; ungues small, equal and simple.

Wings with the first sub-marginal cell considerably longer and a little narrower than the second posterior cell, its base nearer the base of the wing, its stem less than one-fourth the length of the cell; stem of the second posterior cell about two-thirds the length of the cell; posterior cross-vein much longer

than the mid cross-vein, about one and a-half times its own length distant from the mid.

Halteres with pale stems and large rather dusky knob.

Length.—2·8 to 3 mm.

♂. Similar to ♀. Palpi brown; acuminate last two segments deeper brown, with brown plume-hairs; the two apical segments nearly equal. Fore ungues unequal, but not so much so as is usual in *Culex*, the larger with a large tooth, the smaller with a small acute tooth near the base, mid ungues more curved than the fore, both uniserrated, hind small, equal and simple.

Genitalia with the claspers curved with a membranous expansion on one side and a small terminal segment; on the basal lobe is a prominence, with a tuft of three large broad acute spines

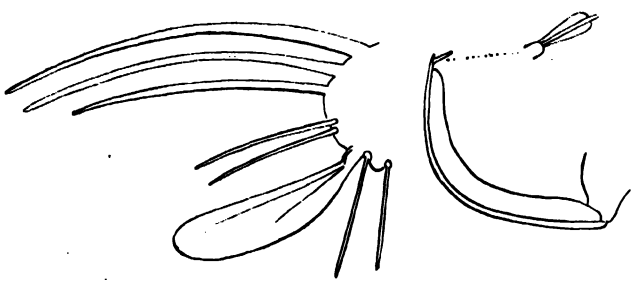


Fig. 197.
Culex minutus. Theobald. ♂ genitalia.

and two small ones, and at the side of the prominence a blade-like plate, rounded apically, and two small spines arising from a common base.

Length.—2·5 to 3·1 mm.

Habitat.—Transvaal (C. B. Simpson).

Observations.—Closely related to *Culex simpsoni*, but differs in the male genitalia in which the foliate plate is rounded apically, not acute, and in the three long flat spines being acute and not curved at their apices and in their being as long as, not shorter than, the claspers.

Culex pallidothorax. Theobald (1905).

Journ. Eco. Biol. I., p. 32 (1905).

Head and thorax uniformly pale, fawn-coloured, the latter with two indistinct median darker lines in front; proboscis dark

brown apically, paler basally; pleurae very pale. Abdomen deep brown, with basal pale creamy bands. Legs uniformly brown, paler at their bases. Male palpi dark brown, unbanded.

♀. Head deep brown, clothed with pale narrow-curved scales, brown and dull ochreous upright forked scales and small flat grey lateral scales. Palpi narrow, deep brown; proboscis deep brown apically, paler towards the base; clypeus deep brown; antennae brown, with narrow grey bands.

Thorax brown, densely clothed with narrow-curved dull pale scales, giving it a general uniform pale fawn-coloured appearance, bristles apparently absent on the dorsum, brown ones laterally, traces of two dusky median lines seen in some lights; scutellum of similar colour to mesothorax, with eight long brown posterior border-bristles spread out fan-like, and with long pale narrow-curved scales projecting between; metanotum brown; pleurae very pale grey.

Abdomen deep brown, with narrow basal pale bands and many pale scales on the last segment and on the apical border of the penultimate, border-bristles pale brown.

Legs uniformly brown, femora pale at base and beneath, a pale spot on the apex of the hind femora; ungues equal and simple.

Wings with the fork-cells of nearly equal length, the base of the second posterior if anything slightly the nearer the base of the wing; stem of the first sub-marginal slightly more than half the length of the cell, stem of the second fork cell more than half the length of the cell; posterior cross-vein about one and a-half times its own length distant from the mid cross-vein, the sixth vein very close to the fifth; halteres ochreous.

Length.—5·5 to 5·8 mm.

♂. Resembles ♀ in general appearance, but the flat scales at the sides of the head spread rather further on to the crown; palpi deep brown, acuminate, apical segment a little longer than the penultimate, both deep brown with deep brown hair-tufts, traces of very narrow pale bands towards the base of each palp. Fore and mid ungues unequal, the larger uniserrate, the smaller simple; hind equal and simple.

Apical segment of abdomen all pale ochreous scaled.

Length.—5·8 mm.

Habitat.—India (Capt. James, I.M.S.).

Observations.—Somewhat resembling *Culex fatigans*, Wied. but easily told by the more uniform fawn-coloured thorax and the

longer thinner ♀ palpi, and by the long narrow-curved scales on the border of the scutellum.

Culex similis. Theobald (1903).

Mono. Culicid. (1903), III., p. 207 (♀); Journ. Eco. Biol. I., p. 33 (1905) (♂).

♂. Head as in the ♀, but narrower; palpi brown, the two apical segments very dark, about equal in length, apical segment acuminate, both with long black hair-tufts, a trace of narrow pale basal banding on the penultimate and another narrow pale band towards the base, apex of the ante-penultimate segment hairy on one side; palpi longer than the proboscis by nearly the whole of the two apical segments. Proboscis dark brown, contracted towards the base. Antennae banded brown and grey with rich brown plume-hairs.

Thorax as in the ♀, but the pale scutellum has nine median posterior border-bristles and the scales are pale golden; metanotum pale ochreous.

Abdomen very hairy, hairs pale golden-brown, banded as in the ♀.

Legs as in the ♀; fore and mid ungues unequal, uniserrated, hind equal, small, simple.

Length.—5·5 mm.

Habitat.—Stanley Town, New Amsterdam, British Guiana (Dr. Rowland).

Time of capture.—July.

Observations.—Described from a specimen bred with ♀'s from larvae taken in the trunk of a hollow tree at the side of a pond in Stanley Town. The ♀'s sent from the same locality are quite normal.

Culex territans. Walker (1856).

Ins. Saund., p. 428 (1856), Walker; Mono. Culicid. II., p. 111 (1901), Theobald; Journ. N. Y. Ent. Soc. IX., p. 178, pl. x. (1901), Dyar; Les Moustiques, p. 367 (1905), Blanchard; Mosq. N. Y. State Bull. 79, Ent. 22, N. Y. St. Mus., p. 307 (1904), Felt and Bull. 97, Ent. 24, p. 483 (1905), Felt; Rept. N. J. State Agri. Exp. Sta. Mosquitoes, p. 325 (1901), Smith.

Thorax brown, clothed with dull golden-brown scales and showing two median dusky lines; head with rather paler scales than the thorax. Abdomen deep brown, with narrow white to

creamy-white apical borders. Legs deep brown, unbanded, femora pale at base and ventrally; knee spot pale. Male palpi dark.

♀. Head brown, with narrow-curved pale grey scales, dark upright forked ones behind, pale ones in front, sides with flat white scales; proboscis deep brown; palpi deep brown with a few pale scales at the base; clypeus brown; antennae deep brown, basal segment brown to deep brown with some small flat grey scales; palpi of three segments, the apical one long, the penultimate short and broad.

Thorax brown, clothed with dull golden-brown narrow-curved scales, with two median parallel bare lines, showing rather dark against the rest of the thorax, chaetae very long, dark and golden-brown; prothoracic lobes grey, with pale narrow-curved scales and brown chaetae; scutellum pale brown with narrow-curved pale scales; pleurae pale greyish with some flat white scales.

Halteres very pale. Legs deep brown to jet black, femora white beneath, their apex and the apex of the tibiae white; ungues small, equal and simple (the tibiae are also pale ventrally, and in some lights they and the tarsi show deep violet reflections).

Abdomen deep blackish-brown with dull violet reflections, the apical borders of the segments with pale creamy scaled bands, appearing almost white in some lights; basal segment with two patches of flat black scales; venter pale grey to white.

Wings with typical *Culex* scales; the first sub-marginal cell much longer and a little narrower than the second posterior cell, its base nearer the base of the wing, its stem rather more than



Fig. 198.
Wing of *Culex territans*. ♀. Walker.

one-fifth the length of the cell; stem of the second posterior cell about two-thirds the length of the cell; cross-veins very faint, the posterior rather more than twice its own length distant from the mid cross-vein.

Length.—5 to 6 mm.

♂. Palpi black, unbanded, hair-tufts black, dense on the two last segments, the apical segment bluntly acuminate, a little shorter than the penultimate.

Thorax and abdomen as in the ♀.

Legs as in ♀; fore and mid ungues unequal, both uniserrate, hind equal and simple.

Wings with the scales slightly broader than in the ♀; the first sub-marginal longer and narrower than the second posterior, its base nearer the base of the wing, its stem less than half the length of the cell; stem of the second posterior nearly as long as the

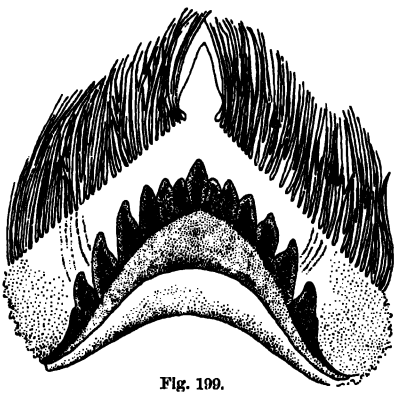


Fig. 199.
Labial plate of *C. territans.* Walker. (After Felt.)

cell; posterior cross-vein longer than the mid, nearly three times its own length distant from it.

Genitalia with the basal lobe stout, obliquely truncate; clasper curved, rather broad, with an apical lateral spine, notched at the tip; the lateral process of the basal lobe has two broad long spines, one curved at the tip, the other ending broadly truncated, and some shorter acute spines (foliate plate?); harpes of moderate length, curved apically, and adorned with short finger-like processes at apex; harpogones thick, keel-like, ending acutely, with teeth on one side of the end.

(Felt describes the claspers as being rather slender, tapering, with a rather long, slender, articulate, terminal spine.)

Length.—5 to 5·5 mm.

Habitat.—New Jersey (J. B. Smith, etc.); New York State (E. P. Felt); Connecticut (H. L. Viereck).

Observations.—Walker's type in the Museum is in poor condition, but was re-described in Vol. II., p. 111. Fresh material sent me by Professor Felt enables me to give a more complete account of it. It is very common in parts of North America, and comes near *Culex geniculatus*. It is not known how the insect hibernates. It rarely occurs indoors. It appears to be local, and does not travel far. The eggs are apparently

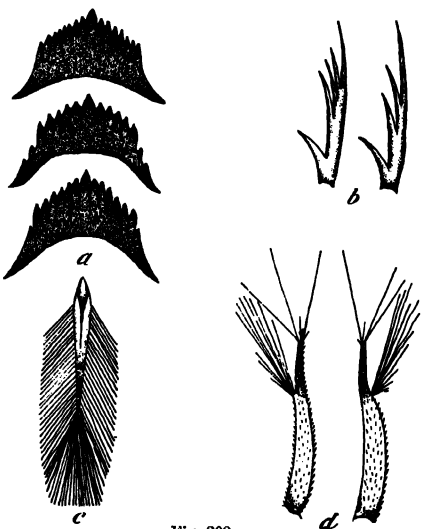


Fig. 200.

Culex territans. Walker.

a, Variations in the labial plate; b, scales of siphon comb; c, scale of the comb of 8th segment; d, antennae. (After Smith.)

laid in small rafts, but break up rapidly, and the individual eggs then sink to the bottom.

The larvae are very characteristic, and measure 6–7 mm. long, white, dirty yellow, or pale green in colour, of slender form. The head is pale creamy white, quite immaculate, with orange-coloured mouth brushes; eyes dark; antennae large, white in colour, with apical third and base black, becoming abruptly narrowed apically where the lateral tuft arises, surface with hair-like spines, apex with three long bristles, one very short one, and a little joint; mentum variable with but 6–8 teeth on each side of the apex; combs of eighth segment composed of 25–50 scales which are very narrow and long with long dense apical

and lateral hairs; the two rows of spines on the siphon each composed of 10–14 spines, each spine with three or four teeth which crowd towards the tip in some of the spines; anal gills about as long as the ninth segment. The siphon is *very long and thin*, usually half as long as the larva, and approaches very closely that of a *Melanoconion*. It mainly lives in clear water, but may be found in stagnant pools. It may occur also in rain barrels and pails. The grassy edge of large ponds seems a favourite place, also the quiet eddies or side pools of even rapid streams. It accompanies *Anopheles*. The larvae occur in New Jersey in April and May, and even on to November.

Culex apicalis. Adams (1903).

Kansas Uni. Sci. Bull. II., 2, p. 26 (1903), (? *C. geniculatus*, Olivier (1791)).

"♀. Head brown; scales mostly light yellow, some long brown ones; palpi and proboscis wholly brown, antennae brown, with base lighter, thorax brown with light brown scales, pile black; abdomen dark brown covered with brownish scales, except those on the posterior margin, which are white, forming on the second and third segments small triangles by projecting forward in the middle, and on the following segments forming bands, ventral surface covered largely with white scales; coxae and base of femora pale yellow, rest of legs and tarsals wholly brown, tarsal claws small and simple; veins of wings sparsely covered with hairs and scales, petiole of first sub-marginal cell one-half the length of that cell, the cross-veins at ends of first and second basal cells distant from each other.

Length.—$4\frac{1}{3}$ mm.

Habitat.—Arizona (Prof. F. H. Snow)."

Note.—This may be a distinct species, but comes very near *Culex geniculatus*, Olivier, and *C. sargentii*, Theobald. From the former it only differs in not having a white band on the palpi, but as the strange second and third abdominal markings agree, it may prove to be only *geniculatus*.

Culex salisburiensis. Theobald (1901).

Mono. Culicid. II., p. 113 (1901), and III., p. 221, ♂ (1903).

♂. Genitalia with very marked spines on lateral process of basal lobe, one is short, thick, straight, and with longitudinal striae, three are long, bent towards the apex, where they are slightly swollen and end in beak-like form; the foliate plate

has many thin dark longitudinal striae; claspers curved, slightly expanded before the apex, with a small lateral terminal segment, expanding apically and truncate with median rod.

Additional locality.—Sierra Leone (Captain Grattan); caught in the bush in January.

Culex janitor. Theobald (1903).

(*The False Crab-hole Mosquito.*)

Mono. Culicid. III., p. 183 (1903); Mosq. Jamaica, p. 24 (1905).

Life-history and habits.—Nothing is yet known of the larval and pupal stages. The adults occur congregated at the entrance of crab-holes with *Deinocerites cancer* by the seashore. They do not fly up and attack one, and are thought by Dr. Grabham to be nocturnal.

The species much resembles *C. secutor*, but can be told by the unbanded female abdomen and the male palpi having the two apical segments much shorter and stouter than in *secutor*. Moreover, its habits and distribution are different, the False Crab-hole Mosquito being littoral, the Mountain Mosquito an inland insect.

Culex christophersii. n. sp.

Head dark, speckled with pale dull yellowish scales, paler at the sides and around the eyes, and a dark patch noticeable on each side; palpi and proboscis deep brown. Thorax clothed with dull pale yellowish scales with two median bare lines and a rich brown spot on each side on the anterior half; pleurae pale greyish white, scutellum very pale. Abdomen brown with basal pale creamy curved bands. Legs brown, unbanded, base and under side of femora pale, also knee spot and apex of hind tibiae. Male palpi brown, acuminate, unbanded.

♀. Head brown, clothed with small narrow-curved pale yellowish scales on the occiput, flat white ones laterally, upright ochreous forked scales in the middle and a patch of black ones on each side, which form the dark lateral spots noticed with a hand lens. Palpi and proboscis deep brown, the latter with testaceous labellae. Antennae brown, basal segment yellowish. Palpi three-jointed, the two basal segments small, the apical one large.

Thorax brown, clothed with narrow-curved pale dull golden scales almost creamy in some lights and a rich brown scaled

roundish area on each side in front, not very noticeable under the microscope as it is under a hand lens; scutellum very pallid and the small almost translucent scales of a pale creamy grey; the mid lobe with six prominent dark border-bristles; the chaetae of the posterior area of the mesonotum are very noticeable owing to the integument and scales becoming very pale before the scutellum, being almost uniform in colour with it; metanotum pale ochreous; pleurae very pallid, with some flat white scales.

Abdomen brown, clothed with deep brown scales with dull violet reflections and with curved basal creamy yellow bands and pale basal lateral spots, venter creamy yellow; basal segment testaceous with some dusky scales in the middle; hairs brown with golden reflections.

Legs brown, unbanded, the femora at the base and beneath, especially of the hind legs white, a small pale knee spot to the hind legs and also a pale spot at the apex of the tibiae; ungues small, curved, equal and simple.

Wings with moderately long fork-cells, the first sub-marginal longer and narrower than the second posterior cell, its base slightly nearer the base of the wing than that of the latter, in length about two and a half times that of the stem; stem of the second fork-cell not quite as long as the cell; posterior cross-vein shorter than the mid, about three times its own length distant from it. Halteres pale ochreous.

Length.—4·5 to 5 mm.

♂. Palpi acuminate brown, the last two segments deep brown and also the apex of the antepenultimate, the last two segments of nearly equal length, with a few long black hairs which also pass to the apex of the antepenultimate segment, but which barely can be called hair-tufts. Proboscis brown, dark at the apex and swollen. Ungues of fore and mid legs unequal, uniserrate, of the hind legs equal and simple.

Length.—4·5 mm.

Habitat.—India (Dr. Christophers).

Observations.—Described from several ♀'s and a ♂ sent to the Museum by Dr. Christophers. It is a somewhat obscure species, the thoracic ornamentation not always being very noticeable. The best character to identify it by is the presence of the black patches of forked scales on the head, in conjunction with the thoracic adornment and banded abdomen it should thus be fairly easy to distinguish.

There is considerable variation in the number of scutellar

chaetae and in the relative length of the fork-cells and their stems.

CULEX SPINOSUS. n. sp. (Lutz, ms.).

Thorax and abdomen brown, the latter densely clothed with pale hairs; head very pale. Palpi of male, proboscis, antennae and legs brown.

♂. Head brown, clothed with long narrow-curved pale creamy scales and pale upright forked scales, small flat dusky grey and creamy lateral scales; proboscis deep brown; palpi deep brown, longer than the proboscis, the last two segments and the apex of the ante-penultimate with deep brown hair-tufts; antennae grey, banded with brown, dense brown plume-hairs.

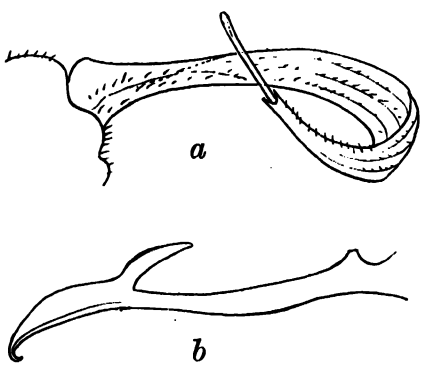


Fig. 201.
Male genitalia of *Culex spinosus*. Lutz.
a, Clasper; b, end of harpes.

Thorax deep brown, with very thin narrow-curved pale golden scales and pale golden hairs; scutellum adorned the same; metanotum deep brown; pleurae brown.

Abdomen semi-translucent, brown, with brown scales, unbanded, the integument of the segments divided by darker lines, densely hairy, hairs pale golden-brown.

Legs brown, unbanded, densely spiny on all parts; fore and mid ungues unequal, both uniserrate, hind equal and uniserrate.

Wings with the fork-cells short, the first a little longer and much narrower than the second, its base nearer the apex of the wing, its stem nearly as long as the cell, stem of the broad second fork-cell longer than the cell; posterior cross-vein longer than the mid, about its own length distant from it.

Basal lobes of genitalia densely spinose, long; claspers rather long, broad, flat and curved over at apex, ending in a rather long *apical* segment, surface of clasper minutely spinose; harpes long, notched on their basal half and terminating in a broad fish-hook-like process; harpogones thick, short-curved, densely chitinous. (There seems to be a foliate plate to the lateral process of the basal lobes.)

Length.—4·8 mm.

Habitat.—Brazil (Dr. Lutz).

Observations.—Described from a single ♂ given me by Dr. Lutz under this ms. name. The specimen has been dissected and mounted in balsam.

It can at once be told from all other *Culex* by the general brown hue, no special adornment, *spinose legs* and uniserrate hind ungues.

CULEX PALUS. Theobald (1903).

Mono. Culicid. III., p. 194 (1903).

Additional locality.—New Amsterdam, British Guiana (Dr. Rowland).

Specimens bred in September.

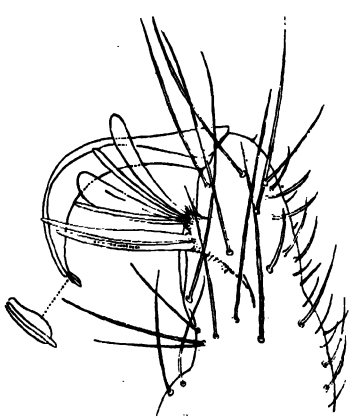


Fig. 202.
Culex palus. Theobald. ♂ genitalia.

The ♂ genitalia with the claspers broad, much curved and rather short, with a small almost terminal segment, enlarged one side of the central line; the lateral process of the basal lobe with two large spines, two foliate plates and then two smaller spines; of the two large spines all are about the same length, but the one nearest the foliate plate is broader than the other two; still nearer the apex is a long spine ending bluntly.

CULEX ALBOPLEURA. n. sp.

Head brown, paler around and between the eyes. Palpi and proboscis deep brown. Thorax uniformly fawn-coloured; pleurae

dull white. Abdomen deep brown, banded with broad yellow basal bands. Legs deep brown, unbanded. Wings with both fork-cells long.

♀. Head brown, with rather large narrow-curved creamy yellow scales and deep brown upright forked scales, flat pale creamy lateral scales and somewhat paler scales around the eyes; clypeus, palpi and proboscis brown, the clypeus paler than the others; antennae brown, segments long and thick, pilose on the internodes, hairs deep brown.

Thorax pale brown, uniformly clothed with dense irregularly disposed dull golden-brown narrow-curved scales, giving a fawn-coloured hue when viewed under a hand lens, chaetae deep brown; scutellum paler brown, with paler narrow-curved scales and seven deep brown border-bristles to the mid-lobe; metanotum deep brown; pleurae dull white, with a large deep brown spot above in front, and three smaller ones behind in the same line, and one below the large one in front.

Abdomen deep brown, with broad yellow basal bands.

Legs deep brown; coxae pale, femora paler at the base; ungues small, equal and simple.

Wings with both fork-cells long, the first sub-marginal very little longer and narrower than the second posterior cell, its base nearly level with that of the latter, its stem not quite half the length of the cell; stem of the second posterior a very little more than half the length of the cell; posterior cross-vein not quite twice its own length distant from the mid cross-vein; the main stem of the fifth vein dark; the sixth situated close to the fifth, much more so than is usual in *Culex*; halteres with pale stem and fuscous knob.

Length.—7 mm.

Habitat.—India (Dr. Christophers).

Observations.—Described from a perfect ♀. This is undoubtedly a true *Culex*, although the sixth vein is abnormally near the fifth. The uniform fawn-coloured thorax, and the long, nearly equal fork-cells and the large size will easily render it distinguishable from the allied species coming around *C. pipiens*. The dull white pleurae, with the large and small brown spots in a line and a small one below the first large one of the five will also help in its identification.

CULEX LATEROPUNCTATA. n. sp.

Head and thorax brown; palpi and proboscis black. Abdomen black, with lateral basal white spots. Legs dark brown, unbanded, a pale tibial spot. Wings rather long, dark scaled; fork-cells long, the stem of the first sub-marginal less than one-fourth the length of the cell.

♀. Head brown, with narrow-curved pale greyish-brown scales and a paler border around the eyes, with brown and black upright forked scales and flat creamy lateral scales; palpi and proboscis and clypeus black; palpi with two long bristles towards the base and short ones on the blunt apex; antennae deep brown, basal segment only bright ochraceous.

Thorax deep brown, with narrow-curved brown scales becoming more golden-brown posteriorly; scutellum pale brown, with narrow-curved creamy scales and seven brown posterior border-bristles to the mid lobe, five large and some smaller ones to the lateral lobes; metanotum brown; pleurae pale greyish.

Abdomen deep rich brown, with basal lateral white spots, looking creamy in some lights, and most prominent on the apical segments; posterior border-bristles pale brown; venter with basal pale bands.

Legs deep brown, unbanded; a pale spot at apex of tibiae, hind first tarsals and tibiae of equal length; ungues small, equal, simple.

Wings rather long and narrow; costa, first long vein, third, fifth, and sixth dark brown, rest paler; the first sub-marginal cell very much longer and narrower than the second posterior cell, more than a third of the length of the whole wing, its base



Fig. 203.
Wing of *Culex lateropunctata*. ♀. n. sp.

much nearer the base of the wing than that of the second posterior, its stem about *one-sixth* the length of the cell; stem of the second posterior not quite half the length of the cell; cross-veins very thin, the posterior longer than the mid, not quite its

own length distant from it; the linear scales on the apical areas of the veins very dense.

Length.—5 mm.

Time of capture.—October.

Habitat.—Supenaam, Essequibo (?). British Guiana (Dr. Rowland).

Observations.—Described from a perfect female. It resembles *Culex scholasticus*, Theobald, but can at once be told by the exceptionally long first sub-marginal cell, with its very short stem, and by the more elongated form of the wings. It is also closely related to the following species, from which it can also be told by the very long first fork-cell.

CULEX NEGLECTUS. Lutz (in Bourroul) (1905).

Mosquitos do Brasil, p. 27 (1905).

"*Length.*—3 mm. without proboscis, which measures a little more than 1 mm.

Proboscis.—Base shiny, thickening towards apex, which is much thickened. Covered with appressed scales, bronze basally, almost black at the apex, with a few fine hairs. Palpi yellowish covered with fine hairs.

Antennae.—Same length as proboscis, hairs dusky yellow with a silver sheen.

Clypeus yellow with white sheen.

Occiput with cream-coloured fusiform scales, very narrow and long on the central area and margin of the eyes, mixed with these are long, erect, bifurcate scales, of a dark colour with golden sheen, densely grouped on the central part, flat, wide imbricated scales, pearly white at the sides; a few dark golden hairs on occiput and light golden hairs at sides.

Prothoracic lobes with a whitish ground and many dark-grey hairs.

Mesonotum.—Ground colour pale with silver sheen, with two parallel lines on the centre, between them a third, the latter only visible from the anterior half. Dark hairs form a continuous line at the sides of the lines mentioned. Scutellum with four long hairs on the mid lobe and the same quantity on the lateral lobes.

Metanotum colourless, with faint black and white reflections.

Pleurae colourless, with white sheen; scales pearly white, on a dark ground; dark patches form two wide horizontal lines as in *Culex pleuristriatus*.

Abdomen.—Cylindrical; dorsum flattened with colourless ground, with small flat scales with varied metallic sheen and fine white hairs; venter with white scales and hairs; dark sides with white patches, which do not reach half across the segments; first segment narrow with dark scales and golden hairs.

Wings with long narrow scales. First fork-cell with short stem less

than quarter length of the cell; the second fork-cell not twice the length of the stem, variable. Posterior cross-vein twice its own length from the mid.

Legs dark coloured, paler at knees and joints of the tibiae and first tarsals, venter paler. A number of long, thin, golden hairs, chiefly on the ventral side of the posterior tibiae; all the tibiae have their apices enlarged, and the posterior ones are shorter than the first tarsals. Ungues small. Halteres pale with dusky knob." (Lutz.)

Note.—Description drawn from a great many specimens. Prevalent in the Cantarlira Hills, near Saõ Paulo, where the larvae occur in bromelia waters.

The larvae have a long thin siphon, and the nymphs are very small.

The larva under the microscope is of a most beautiful colour, with mother-o'-pearl and brick-red tones. In the centre and posterior extremity of the thorax is a horse-shoe-shaped mother-o'-pearl area, the opening towards the head of the larva. Inside of the horse-shoe black, showing at the sides two other black patches. In front of the middle of each side of the thorax there is a very pretty green patch of a rough crescent shape, turned towards the front and between these in the centre a mother-o'-pearl patch. In front of the green crescents and lateral spots run two green lines which divide; there is also a brick-coloured mark on the thorax." (Lutz.)

Genus **ECCULEX.** Felt.*

Bull. 79, Ent. 22, N. York, St. Mus., p. 391, c. App. (1904).

* Felt takes my *Culex sylvestris* as the type of this genus. I cannot see my way to separate it from true *Culex* under which species it is still retained. It is typical of *Culex* in all respects, the genitalia being no more varied than one finds in other closely related species of *Culex*. Felt also includes *Culex melanurus*, Coquillett.

Felt's generic definition is here appended:—

"Petiole of anterior fork-cell of ♀ wing, about one-half its length. Posterior cross-vein more than its length from mid cross-vein. Lateral scales long, well separated from the closely appressed, broad vein scales. Terminal clasp segment of ♂ genitalia with sub-apical spine. Claspette a rather conspicuous basal lobe. Harpes broad, with recurved terminal spine; harpogones terminated by three long recurved spines. Larva with well-developed air tube, comb scales with spatulate base and stout, terminal spine."

Genus **MICROCULEX.** nov. gen.

Head, thorax, and abdomen clothed with scales as in *Culex.*

Wings with the outer costal border spinose as in *Uranotaenia*, venation as in *Culex*, scales very similar, but on the fifth long vein and on stem and lower branch of fork are a double row of long broadish median scales, and long thin median ones on the lower part of the sixth.

The male palpi are bluntly acuminate, very thin, no hair-tufts, but have a few hairs on the penultimate segment. Genitalia with short claspers with long clavate terminal segment. The tooth of the larger fore and mid ungues large, curved and placed at the *side* of the large claw.

This genus comes very near *Culex*, but can at once be told by the wing scales and the male palpi and claspers.

Microculex argenteoumbrosus. n. sp.

Head silvery grey; proboscis unbanded. Thorax rich brown in the middle, silvery at the sides, in front and behind. Abdomen deep brown, with small basal white median and lateral spots. Hind legs with pronounced white basal bands, just traces on the fore and mid legs. Male palpi deep brown, acuminate with three prominent white bands; no hair-tufts.

♀. Head deep brown, almost black, clothed with rather long narrow-curved silvery grey scales and flat similar coloured lateral ones, some ochreous upright forked scales behind, the whole head somewhat ragged. Palpi, proboscis and antennae deep brown.

Thorax black, clothed in the middle with small, narrow-curved bright bronzy-brown scales, around this area larger silvery white scales forming a broad area in front, also at the sides and just before the scutellum, where they surround the bare space; scutellum brown, with silvery-grey narrow-curved scales; four black bristles to the posterior border of the mid lobe and numerous long ones over the roots of the wings; metanotum deep brown; pleurae pale brown and grey.

Abdomen deep blackish-brown, with a small median basal pale spot and white lateral basal spots; posterior border-bristles rather pale, short, but a long one on each side; venter with broad basal white bands.

Legs deep brown; coxae and femora at base and beneath

pale; in the fore legs the apex of the femora and tibiae are white, in the mid legs there is a basal white band to the first tarsal, and the next two tarsals have very narrow bands; in the hind legs there is a broad band to all the segments, the hind tarsal being nearly all white; femora, tibiae and first tarsals spinose; ungues equal and simple; the white apices of the femora and tibiae are rather more densely scaled than the rest, so look swollen.

Wings with the first sub-marginal cell much longer, but very little narrower than the second posterior cell, its base nearer the base of the wing, its stem about one-third the length of the cell, stem of the second posterior about two-thirds the length of the cell; posterior cross-vein longer than the mid, about one and three-fourths its own length distant from it; stem and lower branch of the fifth long vein with a double row of rather long median vein scales; outer border of costa spinose.

Length.—2 mm.

♂. Head as in ♀, but with more forked scales; palpi thin, deep brown, with three white bands, one at the base of the last two segments and a broader one on the ante-penultimate, the last segment shorter than the penultimate, the apical one, bluntly acuminate, ending with a few spines, no lateral hairs, a few long hairs on the penultimate; proboscis thin, much expanded apically. Antennae plumose. Thorax as in ♀, but with longer black bristles. The abdomen with basal white bands. Basal segment of the genitalia, with a prominent lateral lobe, with thin long chitinous flat bristles, becoming almost hair-like at the apex and curved; the claspers rather short and broad, with the lateral terminal segment slightly clavate and passing beyond the apex of the clasper.

Fore and mid ungues unequal, both uniserrate, the larger with a long curved basal *lateral* tooth; hind equal and simple.

Wings with the scales broader than in the ♀, especially on the apical parts of the veins; first sub-marginal cell much longer and slightly narrower than the second posterior cell, its base nearer the base of the wing than that of the second posterior cell, its stem less than one-third the length of the cell; stem of the second posterior cell not quite as long as the cell; posterior cross-vein not quite twice its own length distant from the mid.

Length.—2·5 mm.

Habitat.—Rio Janeiro (Professor Goeldi).

Time of capture.—April.

Observations.—Described from two ♀'s and two ♂'s. It is a very pretty small species, easily told by the thoracic adornment. The ♂ palpi differ from *Culex* proper, and there are some differences in wing scales and in general appearance. This small stout gnat is totally different from any member of that genus.

Genus **PROTOCULEX.** Felt.

Bull. 79, Ento. 22, N. York St. Mus., p. 391, d. App. (1904).

Felt proposed this new genus for my *Culex serratus*, giving the following characters:—"Petiole of anterior fork-cell of ♀ wing about one-half the length of the cell. Posterior cross-vein more than its own length from mid cross-vein. The long lateral vein scales well separated from the appressed vein scales. Petiole of anterior fork-cell of male about equal in length to that of the cell. Terminal clasp segment in ♂ genitalia slender, curved with stout apical spines. Claspette represented by a conspicuous basal spine-bearing lobe and a longer terminal one. Harpes broadly dilated at base, slender apically; harpogones with re-curved apical spine. Larva with median air tube, comb consisting of a few spine-like scales. Type, *serratus*, Theo."

The characters here given are (1) venation and (2) ♂ genitalia. The former are of no value as there is much variation in any series of *serratus*, and the latter are of little more than specific value—in any case, one cannot place a female in this genus as there are no valid ♀ characters given.

Nevertheless *serratus* differs in some respects from *Culex* and Felt's genus is adopted; the following additional characters augment those he gives:—

Scales of head, thorax and abdomen as in *Culex*. Palpi of ♀ of 5 segments, the apical one minute, ♂ palpi with two apical segments swollen; wing scales broader than in *Culex*, the lateral ones more widely separate.

Table of species:—

Thorax in ♂ and ♀ with a median pale stripe.
- Thoracic stripe broad, silvery..... *serratus*. Theobald.
- Thoracic stripe narrow, creamy..... *quasiserratus*. n. sp.

Thorax in ♂ with dense pale scales all over ... *dupreei*. Coquillett.

PROTOCULEX SERRATUS. Theobald (1903).

Culex serratus. Theobald.

Mono. Culicid. II., p. 45 (1902), and III., p. 191 (1903); Bull. 79, Ent. 22, p. 334 (1904) Felt. (*Protoculex serratus*).

Additional localities.—New Jersey, generally, but nowhere common (J. B. Smith); Staten Island, New York (J. R. de la Torre Bueno, in Felt); Fort McPherson, Georgia (Miss Ludlow).

Observations.—The life-history has been worked out by various

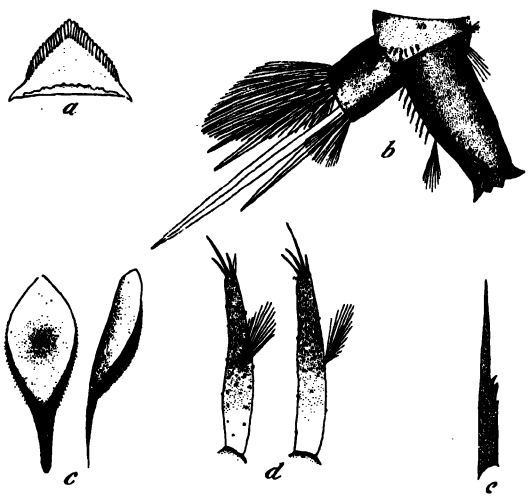


Fig. 204.

Protoculex serratus. Theobald.

a, Labial plate; b, siphon and anal segment; c, scales from 8th segment; d, antennae; e, scale from siphon comb. (After Smith.)

observers in America. The larva varies from 6 to 7 mm. and is of robust build; head dark brown with darker diffused blotches; thorax white with a median black portion; abdominal segments 1 to 6 almost black, 7 and 8 white; anal siphon almost black flared at apex; antennae rather short, one long and three short apical spines and a small articulated segment, lateral tuft dense and about the middle of antenna, a few short spines on the surface; labial plate triangular with 15 to 16 teeth on each side of apex; comb of the eighth segment composed of one regular row of 5 to 6 scales on each side as shown in figure; pecten of siphon

composed of 5 to 7 straight spines serrated finely and irregularly on one side, serrations small.

Full grown larvae have been found in July in New Jersey and again in August and September. They live mainly in woodland pools (J. B. Smith), and probably winter in egg condition. There is no record of its capture in towns or houses in New Jersey, its haunts mainly being swamps.

PROTOCULEX QUASISERRATUS. n. sp.

Head silvery-grey in the middle, dark brown at the sides; palpi and proboscis deep brown. Thorax deep brown with a narrow median pale creamy narrow line, slightly broader posteriorly than in front. Abdomen deep brown with basal creamy-white lateral spots. Legs unbanded; ungues all uniserrate.

♀. Head deep brown with median creamy-grey narrow-curved scales, followed by a large patch of small flat black scales, then creamy ones, with dark upright forked scales behind, deep ochreous ones in front and with the bright pale bristles projecting forwards between the eyes; palpi and proboscis black; antennae deep brown.

Thorax black, clothed with narrow-curved bronzy-brown scales and a median line of pale creamy narrow-curved scales slightly widening posteriorly; chaetae deep brown, especially dense over the roots of the wings; scutellum brown with narrow-curved pale scales in the middle, some darker ones at the sides of the pale ones and narrow-curved dark ones on the lateral lobes; posterior border-bristles brown, six to the mid lobe; metanotum brown, pleurae pale brown with silvery-grey sheen and rather indistinct white puncta of flat white scales.

Abdomen deep brown, with large basal lateral white spots, extending nearly along the whole side of the segments, venter mostly white scaled.

Legs deep brown, unbanded, the ungues of all the legs uniserrate.

Wings with the first sub-marginal cell longer and slightly narrower than the second posterior cell, its base slightly nearer the base of the wing, its stem half the length of the cell, stem of the second posterior as long as the cell; posterior cross-vein a little longer than the mid, about its own length distant from it. Wing scales rather dense and the linear ones rather broad.

Length.—5 mm.

Habitat.—Red Hills, Jamaica (Lord Walsingham and Dr. Grabham), Brazil (Dr. Lutz).

Time of capture.—June and July (Jamaica), November (Brazil).

Observations.—Described from a series of five ♀'s. This species comes very close to *C. serratus*, Theobald, on the one side to *C. dupreei*, Coquillett, on the other. From *serratus* it may be known by the much smaller median pale thoracic line and from *dupreei* by its larger size and narrower median thoracic line, which although it is wider behind than in front is not nearly so much so as in that species, and the median stripe is creamy-yellow not silvery-white.

This species is very variable, some show only a trace of the median pale line, in others it is practically absent.

Dr. Grabham writes me the ova are laid separately and are whetstone-shaped.

PROTOCULEX? DUPREEI. Coquillett (1904).

Culicida dupreei. Coquillett.

Culex dupreei. Coquillett.

Canad. Entomo. XXXVI., p. 10 (1904) Coq.; Ento. News, XV., p. 44-51, pl. VII. (1904), Smith.

Coquillett states this species is near *serratus* but much smaller, and the white-scaled median vitta of mesonotum broader.

He gives as locality Baton Rouge, Louisiana. Type in U.S. National Museum, No. 7340.

The males sent me do not look at all like *serratus*, but on the other hand closely resembles *confirmatus*, Arribalzaga, but the females figured bear a close resemblance to *serratus*, Theobald, and *quasiserratus*, n. sp. The description of the male given here is from specimens sent me by Felt. That of the female is Coquillett's.

♂. Head deep brown, clothed with greyish-white scales; antennae densely plumose, plume-hairs rich brown, apices of hairs grey; palpi brown, two apical segments with brown hairs, grey beneath, slightly longer than the brown proboscis.

Thorax deep brown, clothed with greyish-white narrow-curved scales, which become duller, smaller and narrower laterally, so

that the median area resembles a *very broad* line, taking up most of the thorax; scutellum testaceous, with two dark patches and with narrow-curved greyish-white scales; six posterior border-bristles to the mid lobe; metanotum deep brown; pleurae testaceous with some flat grey scales.

Abdomen testaceous with brown scales with violet reflections, the segments with large basal lateral grey spots, in some cases almost meeting to form bands, and the last two segments with many grey scales, not densely hairy, but the posterior border hairs long and pale and prominent laterally.

Legs brown, unbanded; femora silvery grey beneath, and the whole legs show pale dull iridescent colouring; ungues of fore and mid legs unequal and hind equal, all six uniserrate.

Wings with the first sub-marginal cell longer and much narrower than the second posterior cell, its base very slightly nearer the apex of the wing, its stem nearly as long as the cell, stem of the second posterior cell very little longer than the cell; posterior cross-vein rather more than its own length distant from the mid; scales rather broader than in *Culex*, especially the median vein scales.

Length.—2 to 3 mm. (proboscis 1·5 mm.).

Habitat.—Baton Rouge, Louisiana (D. W. Coquillett); New Jersey (J. B. Smith).

Time of appearance.—July to September.

Observations.—The male resembles Arribalzaga's *confirmatus* more than my *serratus*, but it can at once be told by the pale mesothoracic scales extending over all the thorax. The serrated hind ungues of the male are prominent and also the apical grey hue of the dark brown antennal plume-hairs. The ♀ resembles a small *serratus*. Felt states that the larvae were met with in a woodland pool, and are remarkable on account of their remaining near the bottom. They were never observed in confinement to rise voluntarily to the surface. They are very inconspicuous and transparent, and they hide amongst the leaves at the bottom of the pools. The larva is described by Professor J. B. Smith. It has the head almost twice as broad as long; antennae half as long as the head, almost uniform in thickness two-thirds from the base, then tapering to the tip, which has four spines and a stout, short segment; lateral hair-tuft sparse, near middle. Air tube tapers evenly to the tip, each pecten composed of about twelve uniformly tapering spines, the latter with three sharp, well-defined teeth near the base. Comb composed of from eight

to ten flattened, somewhat diamond-shaped scales arranged in a slightly curved row.

Professor E. P. Felt says: When mature they reach 5·5 mm., but may reach 6·5 mm. Colour, dirty white or yellowish, almost

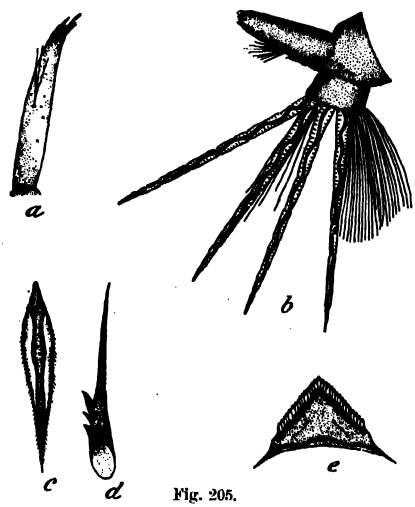


Fig. 205.

Protoculex (?) *dupreei*. Coquillett.

a, Antenna; b, siphon and anal segment; c, scale of 8th segment; d, scale of siphon comb; e, labial plate. (After Smith.)

transparent; head yellow with faint dusky area on apex; antennae short, pale yellow, apex with four short spines and a small joint, a few small stout spines on surface, lateral tuft of three thin hairs just above the middle; labial plate triangular, 13–16 equal teeth on each side of apex; comb of eighth segment of a single regular curved row of scales, narrow and acuminate and finely hairy; pecten of siphon with 9–13 spines, very acuminate, slightly curved, and with three to four teeth near base; anal gills very long, thin, and acuminate, the latter forming a very marked character.

Genus **BANKSINELLA.** nov. gen.

Head clothed with a small median area of narrow-curved scales, and broad lateral areas of flat scales. The ♀ palpi short, of three segments, the apical one long, longer than the two basal

ones; the ♂ palpi longer than proboscis, composed of two segments only, the apical one acuminate about one-third the length of the other segment; slight hair-tuft. Scales of thorax all narrow-curved ones. Wing venation normal. This genus differs from *Culex* in having the flat lateral cephalic scales spreading much further on to the vertex and in the structure of the antennae.

They lay their ova separately as is done by *Stegomyia*. Mr. C. S. Banks pointed out its doubtful position as a *Culex*, hence I have named the genus after him.

BANKSINELLA LUTEOLATERALIS. Theobald (1901).

Culex luteolateralis. Theobald.

Mono. Culicid. II., p. 71 (1901).

A single ♀ of this very marked species in bad condition has been sent by Dr. Balfour from the Sudan.

The only difference from the type is in the distribution of the yellow and black vein scales.

The head has narrow-curved golden scales in the middle, flat ochreous and dusky ones at the sides; the proboscis is black and the palpi orange-scaled at the base, black at the tip.

The thorax is deep black with a broad line of bright orange yellow scales on each side of the mesonotum; there are also a few scattered gold scales amongst the narrow dull brown ones that adorn the middle of the mesonotum.

The abdomen is black with violet reflections and with basal creamy-yellow bands to the segments and also small lateral basal spots.

Legs dull ochreous with brown scales, unbanded, but the base and under surface of the femora are ochreous.

The wings in the type are clothed with black and yellow



Fig. 206.
Wing of *Banksinella luteolateralis.* (♀.) Theobald.

scales, black on costa and on all the third long vein, on the branches of the fourth and some on the sixth, all the rest dull yellowish with a few dusky scales here and there. First submarginal cell longer and narrower than the second posterior, its base not nearer the base of the wing, its stem less than one-half the length of the cell; posterior cross-vein more than its own length distant from the mid.

In the Sudan specimen the yellow scales are confined to the base of the first longitudinal vein and along the stem of the fifth long vein, and a few may be detected here and there elsewhere.

Length of ♀ 3·5 to 4·5 mm.; ♂ 4·5 to 5 mm.

The Sudan specimen came from the Blue Nile (Mr. Friedrichs). This insect has evidently a wide distribution, for there seems to be no difference between those from Africa and those from the Malay States. Dr. Aubrey Hodges has recently written me that it is common around Gondokoro and Mr. C. S. Banks and Miss Ludlow that it occurs in the Philippine Islands. Mr. Banks tells me the eggs are laid separately.

Var. *pallida*. n. v.

♀. Head deep brown, with narrow-curved pale grey scales in the middle.

Thorax deep brown, with a broad line of pale silvery grey scales on each side diverging posteriorly and with four median parallel narrow pale lines; chaetae as in the type.

Abdomen with traces of pale basal lateral spots.

Wings with broad pale creamy scales on the sub-costal, base of first long vein, on the fifth from the fork to base, narrow lateral ones on the second and fourth, some appearing slightly swollen at their apices.

For the rest the same as the type.

Length.—4·5 to 5 mm.

Habitat.—Inkutu, West Africa (Drs. Dutton and Todd).

Observations.—Described from two ♀'s. It resembles the type, but the pale scales and median parallel pale lines at once separate it. There are no structural differences observable.

Var. *albothorax*. n. v.

♀. Head with narrow-curved pale grey to white scales in the middle, deep brown flat scales at the sides and then white ones.

Thorax black, with white narrow-curved scales on each side, and some in the middle of the bright brown curved scales forming the median area; chaetae bright golden over the roots of the wings as in the type; scutellum black with bright golden brown chaetae and silvery white narrow-curved scales.

Abdomen with prominent creamy basal-curved spots, not quite bands.

Wings as in the previous variety, but the pale flat scales spreading on to the lower branch of the fifth vein.

Habitat.—Inkutu, West Africa (Drs. Dutton and Todd).

Time of capture.—January 18th.

Observations.—Described from a ♀ caught in the bush. It structurally resembles the type, but the colour of the scales is very different.

Genus **CULICELLA.** Felt.

Bull. 79, Ent. 22, N. York St. Mus., p. 391 c. (1904), Felt; Proc. Ent. Soc. Wash. VII., p. 49 (1905), Dyar.

Professor E. P. Felt takes *Culex dyari*, Coquillett, as the type of this genus. Dr. Dyar (Proc. Ent. Soc. Wash. vii., p. 49, 1905) places Coquillett's *Culex melanurus* here also, whilst Professor Felt places it in the genus *Ecculex*.

The following is Felt's definition of the genus:—

"Petiole of anterior fork-cell of ♀ wing about two-thirds its length. Posterior cross-vein about its own length from mid cross-vein. Lateral vein scales well defined. Petiole of anterior fork-cell in ♂ equal or longer than its cell; posterior cross-vein less than its own length from the mid cross-vein. Terminal clasp segment of male genitalia slender, slightly curved, with small apical spine. Claspette a large basal lobe with prominent chitinous spine. Larva with very long air tube and with a large comb consisting of linear, ciliated scales."

I have been unable to differentiate this genus.

Genus **LOPHOCERATOMYIA.** Theobald.

Ann. Mus. Nat. Hung. III., p. 93 (1905); Journ. Bomb. Nat. Hist. Soc. XVI., p. 245 (1905) (*Lophoceraomyia*).

Head clothed with small narrow-curved scales, upright forked scales and very small flat ones laterally; thorax with narrow-

curved scales, also the scutellum. Wing scales broad and short, especially on the first and the second long veins, more elongated on the third and fourth, the lateral ones of the fifth long and thin; ♀ palpi short, two-jointed, but with traces of two notches near the base, apical segment as long as the rest of the palp, pointed; antennae of the ♀ normal. The ♂ palpi long, longer or shorter than proboscis, acuminate, three-jointed, the two apical segments equal, or nearly equal, a *characteristic process towards the base.* *Male antennae with striking peculiarities*, the sixth segment with a large tuft of long narrow flat plates on the outer side, the seventh and eighth with small tufts on the inner side, the ninth with a long hook-like process, the next two segments with the inner verticillate hairs partly darkened and denser than the rest.

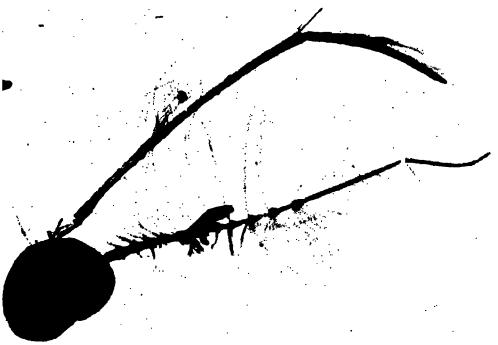


Fig. 207.
Head of a male *Lophoceratomyia fraudatrix.* Theobald.

At the junction of the verticillate hairs at tenth, eleventh, twelfth, and thirteenth segments are two small curved pectinated processes. They are present on all the other segments, but are not so pronounced.

This genus is very distinct, especially in the male sex, owing to the strange antennal processes. The wing scales and palpi of the female will at once separate them from *Culex*, which they resemble at first sight. What the function of the extraordinary male antennal processes is we do not at present know.

Four species occur in this genus, two from New Guinea, one from Singapore, and one from Ceylon.

The structure of the antennal organs of the male differ in each species.

LOPHOCERATOMYIA UNIFORMIS. Theobald (1905).

Journ. Bomb. Nat. Hist. Soc. Vol. XVI., p. 245 (1905).

Head brown with a grey border around the eyes; proboscis deep brown, slightly swollen apically; palpi deep brown. Thorax tawny brown, pale at the sides; pleurae grey, green, or pale brown. Abdomen deep chocolate brown, unbanded; venter dull ochreous. Legs long, deep brown, except for pale coxae and bases of femora. Wings transparent; fork-cells small; male palpi brown, acuminate, longer than the proboscis.

♀. Head brown, clothed with narrow-curved grey scales and numerous upright black forked ones behind, becoming fewer and browner near the front, thus covering most of the grey-scaled head and giving it a brown appearance, except around the eyes, where the grey scales only exist; clypeus testaceous; proboscis black, swollen apically, about two-thirds the length of the whole body, labella testaceous; palpi thin and rather long, about one-fifth the length of the proboscis, black scaled; antennae brown with narrow pale bands and black verticillate hairs.

Thorax shiny brown, clothed with narrow-curved tawny brown scales, which become much smaller and almost black just before the scutellum, bristles long and black, scales at the sides somewhat paler in certain lights; scutellum pale brown with small narrow-curved dark scales; metanotum pale brown; pleurae pale grey, dull white or pale green, almost nude. Prothoracic lobes small, nude, pale brown.

Abdomen deep rich chocolate brown to dull brown; no banding or lateral spots; border-bristles pale; venter dull ochreous.

Legs deep brown, rather long, the coxae and bases of femora grey; ungues all equal and simple.

Wings with the branches of the first sub-marginal cell and the stem with rather long scales, those on the first long vein typical, also the spiny upper costal border; other lateral vein-scales may appear linear, but when flattened are much broader than in a true *Culex*; fork-cells short, the first sub-marginal considerably longer and narrower than the second posterior; its base nearer the base of the wing, its stem about half the length of the cell; stem of the second posterior as long or longer than the cell; mid cross-vein longer than the supernumerary,

both united, posterior cross-vein longer than the mid nearly three times its own length distant from it; fringe dark and dense.

Halteres with pale stem and fuscous knob.

Length.—3·5 to 4 mm.

♂. Palpi long and thin, longer than the proboscis by the last and nearly half the penultimate segments, with a few spines or hairs only on the two apical segments, the two segments nearly equal, black, remainder of palpi dull yellowish-brown. Fore ungues unequal, uniserrated; hind equal and simple; mid (?).

Wings with short fork-cells, the first sub-marginal considerably longer and narrower than the second posterior; its base a little nearer the base of the wing, its stem about two-thirds the length of the cell; stem of the second posterior slightly longer than the cell; posterior cross-vein longer than the mid, sloping backwards and about two-and-a-half times its own length distant from it; with the exception of the apical portions of the veins there are no lateral vein scales, only a narrow single row of median ones.

Halteres pale with fuscous knob.

Length.—4 mm.

Habitat.—Peradeniya, Ceylon (E. E. Green).

Time of capture.—May.

Observations.—Described from two ♂'s and several ♀'s. It generally resembles *L. fraudatrix*, Theobald, but the ♂ can at once be told by the different palpi and antennal organs.

LOPHOCERATOMYIA FRAUDATRIX. Theobald (1905).

Ann. Mus. Nat. Hung. III., p. 94 (1905).

Head black, with a pale triangular median frontal area. Thorax brown. Abdomen black, unbanded. Legs uniformly brown, paler at the base. Wings unspotted, veins and scales brown, with slight ochreous tinge. Male with rich deep brown antennal hairs and black tuft-organs.

♀. Head black, with some small narrow-curved pale and dull golden scales in front, sides with dull creamy small flat scales, similar grey ones, forming a line around the eyes; proboscis brown; palpi brown; antennae brown, basal segment black.

Thorax brown, with very small and small scattered pale dull

brown narrow-curved scales, some almost hair-like; scutellum paler brown, with the same scales; metanotum brown; pleurae pale brown.

Abdomen black, narrow, no trace of banding or lateral spots.

Legs brown, unbanded, bases pale ochreous and femora also pale beneath; the mid femora rather swollen, distinct apical tibial spines on the fore and mid legs.

Ungues equal and simple.

Wings with the costa, sub-costal and first long veins densely scaled, with short, rather large broad scales, the costal border with large spine-like scales; branches of the second also with rather broad, short scales, longer and narrower ones on the third and fourth long veins, considerably longer on the fifth and sixth; fringe scales of two series, rather large and acuminate, border-scales prominent, projecting outwards; first sub-marginal cell longer and narrower than the second posterior cell, its stem half the length of the cell, its base very slightly nearer the base of the wing; stem of the

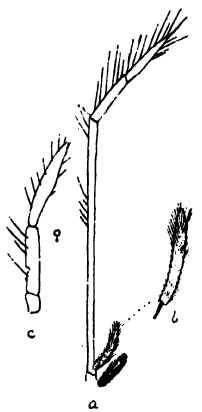


Fig. 208.
Female (c) and male (a) palp of *L. fraudatrix*; b, basal organ of ♂ palp.



Fig. 209.
Wing of *Lophoceratomyia fraudatrix*. ♀. Theobald.

second posterior cell nearly as long as the cell; posterior cross-vein about twice its own length distant from the mid cross-vein; a very distinct pseudo-vein between the fifth and sixth veins. Halteres pale, with faintly fuscous knob.

Length.—2·5 to 3 mm.

♂. Palpi and proboscis brown; antennae banded black and grey, with brown verticillate hairs and black tuft-organs. Thorax and abdomen as in the ♀.

Wings with the fork-cells very short, the first sub-marginal longer and narrower than the second posterior, its stem rather more than two-thirds the length of the cell, its base nearer the

apex of the wing than that of the second posterior cell; stem of the second posterior cell not quite as long as the cell; posterior

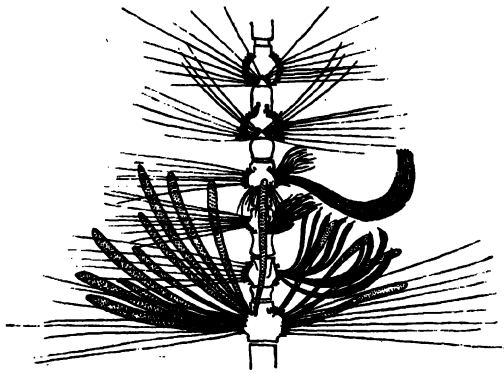


Fig. 210.
Antennal organs of *Lophoceratomyia fraudatrix*. ♂. Theobald.

cross-vein nearly three times its own length distant from the mid cross-vein; the pseudo-vein between the fifth and sixth long veins very distinct.

Ungues of fore and mid legs unequal, the fore both uniserrated



Fig. 211.
Wing of *Lophoceratomyia fraudatrix*. ♂. Theobald.

the mid simple, the hind small, equal and simple. Claspers of the genitalia curved and twisted, blade-like.

Length.—♂ to 4 mm.

Habitat.—New Guinea, Friedrich-Wilhelmshafen (Biró, 1900), and Stephansoff, Astrolabe Bay (Biró, 1900).

Observations.—Described from a large series of ♂'s and several ♀'s. The false vein is very prominent in all the specimens. The allied species described here differ from *fraudatrix* in having the antennal organs of different form.

Types in the National Museum, Budapest.

LOPHOCERATOMYIA BREVIPALPUS. Theobald (1905).

Ann. Mus. Nat. Hung., p. 96 (1905).

Head deep brown, some golden scales around the eyes; ♂ palpi much shorter than the proboscis, brown; proboscis fairly long, yellowish-brown to deep brown, swelling apically. Antennae with distinct prominence on inner side of basal seg-

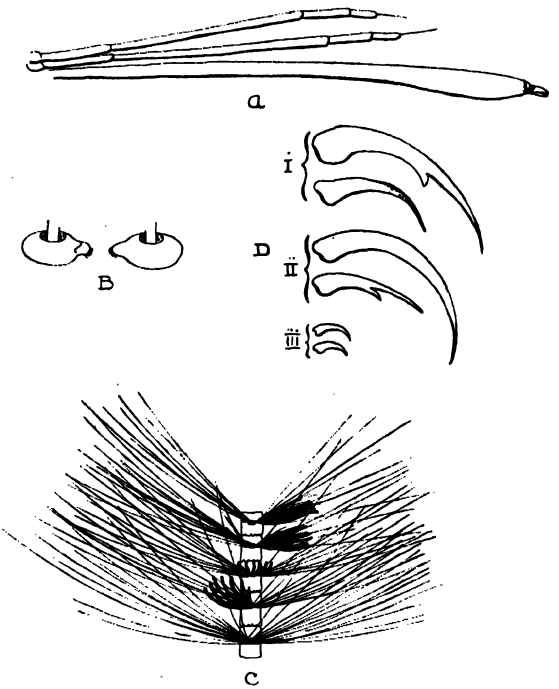


Fig. 212.

Lophoceratomyia brevipalpus. (♂.) Theobald.

a, Male proboscis and palpi; b, basal segments of antennae; c, antennal organs; d, ungues.

ment; antennal or tuft-organs smaller than in the preceding species. Thorax deep brown, shiny, with brown scales, a line of grey scales on each side in front of the wings; pleurae yellowish-brown. Abdomen black dorsally, base of venter yellowish. Legs deep brown, coxae and venter of femora yellowish.

♂. Head deep brown, with very small narrow-curved dull brown scales, slightly golden around the eyes and with numerous

deep ochreous upright forked scales and small flat dull brown ones laterally; palpi shorter than the proboscis, thin, scaly, brown, except at the actual base where they are testaceous, the two apical segments are small, the penultimate a little longer than the apical one, apex bristly (the exact number of segments cannot be made out owing to the scales). Clypeus small, rather long and bright testaceous. Proboscis brown, yellowish-brown at the base, fairly long and swollen apically. Antennae with the basal segment brown with a hoary sheen, testaceous in the cup-like depression and with a very pronounced blunt prominence on the inner side, the prominence has fine hairs on one portion, the four following segments normal, the sixth to ninth with varied processes as shown in the figure, the two long apical segments very pubescent. Thorax deep shiny brown, with scattered bronzy-brown narrow-curved scales at the base of the wings, the integument is pallid; prothoracic lobes with dull grey flat scales; scutellum testaceous, with small narrow-curved black scales and four black bristles to the mid lobe; pleurae ochreous brown.

Abdomen violet-black, with bronzy reflections in certain lights, basal segment bright testaceous, with two spots of black scales; venter brown apically, yellowish-brown to ochreous basally; hairs brown.

Legs uniformly brown with bronzy reflections, coxae pale ochreous, and also the femora beneath; ungues of the fore-legs unequal, the larger curved and thick and uniserrated, the smaller simple; the mid unequal, the larger much curved and simple, the smaller uniserrated, hind very small, equal, simple and curved.

Wings with the fork-cells short, the first sub-marginal longer and narrower than the second posterior cell, its base nearer the base of the wing than that of the second posterior cell; its stem more than two-thirds the length of the cell; stem of the second posterior a little longer than the cell; supernumerary cross-vein shorter than the mid, the mid longer than the posterior cross-vein, the latter about three times its own length distant from the mid; scales on the branches of the fork-cells *Taeniorhynchus*-like, but small, on the stems and on the fifth and sixth veins median vein scales alone present. Halteres with pale stem and slightly fuscous knob.

Length.—4·5 mm.

Habitat.—Singapore (Biró, 1902).

Observations.—Described from a single perfect male. In spite of the shorter palpi and the strange prominence on the

basal antennal segment this species is placed in this genus as the peculiar antennal organs are so very similar as well as all the squamose characters. It can easily be distinguished from *L. fraudatrix* by the smaller size of the antennal organs and their different structure.

The type is in the National Museum, Budapest.

Genus **TRICHOPRONOMYIA.** Theobald.

Ann. Mus. Nat. Hung., p. 98 (1905).

Head clothed with narrow-curved, upright forked and flat lateral scales. Proboscis with dense tuft of hairs towards the middle and shorter hairs on apical portion. Antennae plumose. Thorax with narrow-curved scales on mesothorax and with a patch of outstanding scales on each side before the wings somewhat like the cephalic forked scales; prothoracic scales flat; scutellar scales narrow-curved. Wings with *Taeniorhynchus*-like scales on the branches of the fork-cells, some small *Mansonia*-like ones on the base of the first long vein and on the sub-costal vein.

This genus is founded on the hairy proboscis; characteristic wing scales separating it from *Culex* and also the peculiar arrangement of scales in front of the wings on the mesothorax. The palpi are damaged.

Two species are known.

Trichopronomyia annulata. Theobald (1905).

Ann. Mus. Nat. Hung. III., p. 98 (1905).

Head brown with pale yellowish scales, a dusky patch on each side. Proboscis brown with a creamy yellow band on the apical half, long hairs on each side just below the band and shorter ones above it. Thorax brown with pale golden and creamy white scales, the latter forming more or less a patch on each side. Abdomen deep brown, with basal creamy yellow bands and a few scattered creamy scales on the apex. Legs brown with narrow pale yellow basal and apical bands. Wings with *Taeniorhynchus*-like scales.

♂. Head brown with narrow-curved pale creamy yellow scales and flat pale creamy ones at the sides, dense yellow upright forked ones centrally, black ones laterally, forming two dark areas. Eyes coppery red. Proboscis deep brown with a

yellow band on the apical half, below the yellow band the proboscis has long dense black hairs and on the dark area towards the apex numerous shorter dark hairs. Antennae banded brown and white; verticillate hairs brown; the two long thin apical segments with dense pale yellowish hairs all over them.

Thorax brown with narrow-curved pale golden scales in front and pale creamy white ones at the sides forming more or less pale lateral patches, in front of the wings at the sides a patch of outstanding yellow upright scales very similar to the forked scales of the head, also numerous black and brown bristles rather short thick and curved; prothoracic lobes with small pale flat scales and yellow hairs; scutellum brown with small narrow-curved dark scales basally, pale creamy yellow apically; border-bristles black and long; metanotum brown; pleurae with patches of small flat white scales.

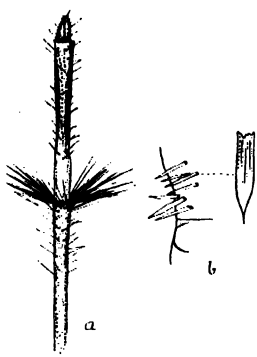


Fig. 213.
Trichopronomyia annulata. Theobald. ♂.
a, Apex of proboscis; b, scales in front of wing.

Abdomen hairy, deep brown, with narrow creamy-yellow basal bands; the first segment testaceous with a median tuft of flat dark scales and yellowish-brown hairs; apical segment with scattered yellow scales all over it; genitalia brown, hairy (not scaly), claspers simple, brown.

Legs brown with scattered pale scales; all tarsal segments with narrow pale bands involving both sides of the joints.

Wings with the fork-cells short, the first submarginal longer and narrower than the second posterior, its base nearer the apex of the wing, its stem about two-thirds the length of the cell; stem of the second posterior rather longer than the cell; posterior cross-vein about its own length distant from the mid cross-vein;



Fig. 214.
Wing of *Trichopronomyia annulata*. (♂.) Theobald.

third vein continued as a distinct pseudo-vein to the base of the wing, another pseudo-vein between the fifth and sixth; scales on the branches of the fork-cells and the apex of the first long vein *Taeniorhynchus*-like, others smaller, except on the sub-costal and basal half of the first long vein where some are similar in form to *Mansonia* scales but smaller.

Halteres with pale stem and black knob.

Length.—5·5 mm.

Habitat.—Friedrich-Wilhelmshafen, New Guinea (Biró, 1900).

Observations.—Described from a single ♂. It is a very marked species told at once by the hairy proboscis. From the following species it can be told by the banded abdomen.

Type in the National Museum, Budapest.

TRICHOPRONOMYIA MICROANNULATA. n. sp.

Head brown, pale scaled; proboscis with pale band. Thorax deep fawn-coloured with bright brown scales, two median bare paler lines which converge posteriorly, a curved one on each side, in front of wings. Abdomen deep brown with basal yellow spots to the segments. Front and mid legs brown, unbanded, hind with faint banding involving both sides of joints.

♂. Head brown with narrow-curved pale scales, pale upright forked scales in the middle, dark at the sides, flat creamy-white lateral scales, a line of small ones spread partly around the eye borders; proboscis deep brown, enlarged on the apical half, a narrow pale band on the apical half, below which are longish hairs on each side decreasing in size to the base. Palpi brown, deep blackish apically, acuminate, the apical segment longer than the

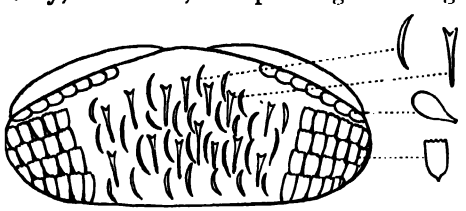


Fig. 215.
Squamose cephalic adornment of *Trichopronomyia microannulata*. Theobald.

penultimate, hair-tufts on the last two and apex of the ante-penultimate black; the dark apical portion shows deep violet reflections.

Thorax brown, adorned with scanty narrow-curved bright golden-brown scales, the denuded surface shows darker and paler

lines, a paler curved one on each side in front of the roots of the wings, two median darker ones which converge posteriorly (the effect being quite different under the microscope to under a hand-lens), chaetae over the roots of the wings brown ; the scales are paler in front of the scutellum, which is also clothed with narrow-curved pale scales and with eight posterior border-bristles to the mid lobe; metanotum bright brown ; pleurae pale silvery grey.



Fig. 216. Male palp of *T. micro-annulata.*

Abdomen shiny black, clothed with deep brown scales with dull violet black reflections, each segment with a basal median creamy-yellow spot, basal segment all dark and the last two with almost complete basal bands, hairs brown. Genitalia with large claspers very broad at the base becoming finer apically with a lateral apical expanding segment ; lateral process of basal lobe with three large spines, the two largest with fine bent tips, the third acuminate, a leaf-like plate and then a smaller spine.

Legs deep brown ; the hind pair with apex of tibiae, first, second and third tarsals very narrowly pale banded, the pale scales to some extent involving both sides of the joints, traces of this banding seen in fore legs and still less on the mid ; fore and mid ungues unequal, both unisserrate, the smaller with a tooth close to base ; hind equal and simple.

Wings with rather dense moderately large lateral scales, especially on the branches of first fork-cell ; first fork-cell longer and narrower than the second posterior cell, its base a little nearer the base of the wing, its stem about one-third the length of the cell ; stem of the second posterior nearly two-thirds the length of the cell ; supernumerary and mid-cross veins united, both bending in towards the base of the wing, the posterior cross-vein about twice as long as the mid about one and a half times its own length distant from it ; halteres with dusky pallid stem, the knob dark inside.

Length.—6 mm.

Habitat.—Stanley Town, New Amsterdam (Dr. Rowland).

Time of capture.—July.

Observations.—Described from a single perfect male.

It is somewhat obscure, but the hairy banded proboscis will at once separate it from the species of *Culex* which it resembles and places it in the genus *Trichopronomyia.*

It differs from *T. annulata* in not having a banded abdomen.

Genus **TAENIORHYNCHUS.** Arribalzaga.

Dipt. Argent., p. 47 (1899), Arribalzaga (Mod. Theobald); Mono. Culicid. II., p. 190 (1901), Theobald; Gen. Ins. Fam. Dipt., p. 30 (1905); Les Moust., p. 381 (1905), Blanchard.

Arribalzaga's genus was founded on Wiedemann's *Culex taeniorhynchus*, but he evidently describes in part Walker's *titillans*, which he gives as a synonym, and in the same genus he also describes two new species, *confinnis* and *fasciolatus*, again quite distinct. I am inclined therefore, until Arribalzaga's specimens can be found and examined, to let matters stand as they do now, taking *confinnis* or *fasciolatus* as the types of the genus.



Fig. 217.
Egg mass of *Taeniorhynchus arribalzagae*. Theobald (after Goeldi).

A number of species placed in this genus provisionally—the yellow group—which present quite a different facies to *fasciolatus* and the other brown species I pointed out, would have to be placed in a new genus (Gen. Ins. Fam. Culicid., p. 31, 1905).

Goeldi has created a genus into which these all fit admirably (*Chrysoconops*).

The species now left in *Taeniorhynchus* are the following:—

T. confinnis, Arri.; *T. fasciolatus*, Arri.; *T. tenax*, Theob.; *T. richardii*, Ficalbi; *T. perturbans*, Walk.; *T. ager*, Giles; *T. arribalzagae*, Theobald; *T. walsinghamii*, n. sp.; *T. argenteus*, Ludlow.

The life-history and structure of larvae, etc. of *Taeniorhynchus* has been worked out by Professor Goeldi. The two species

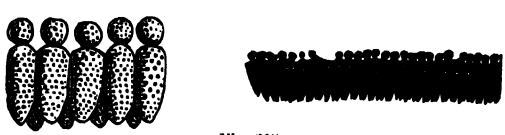


Fig. 218.
Ova of *Taeniorhynchus fasciolatus* (after Goeldi). (Right-hand figure enlarged, left still more so.)

detailed by him are *fasciolatus* and *arribalzagae*. The eggs are laid in a double-rowed chain, united together as in *Culex pipiens*. The egg chain is strongly convex on the lower side. The number of eggs in each chain was found to be from 60 to 63. They

hatch in about 4½ days. The surface is covered with coarse conical papillae.

The figures of the larva and ova are partly those of Professor

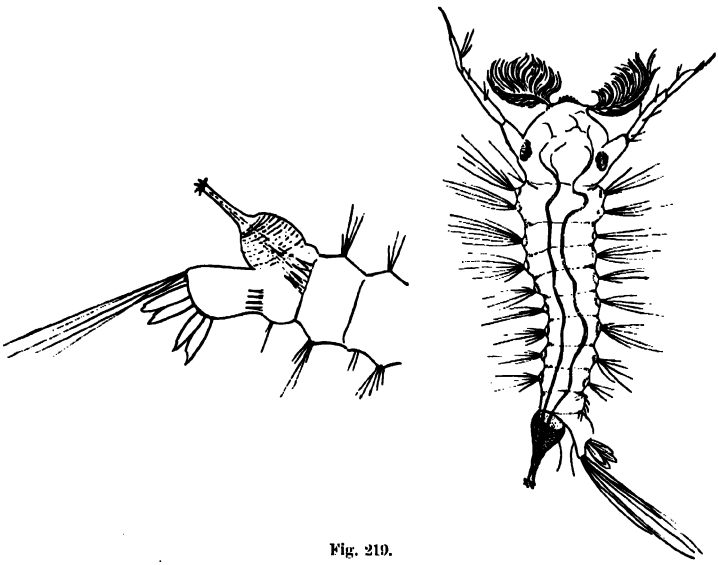


Fig. 219.

Larva and siphon and anal segments of *Taeniorhynchus fasciolatus*; Arribalzaga (after Goeldi).

Goeldi and have been also prepared from specimens lent me by Dr. Lutz. The most noticeable feature is the curious shaped air tube.

Dr. Dyar has also figured the larvae of *Taeniorhynchus perturbans*, Walker, which presents a similar appearance, but the egg rafts contain 150 eggs.

Taeniorhynchus walsinghamii. n. sp.

Head brown with grey and brown scales; proboscis banded; palpi brown white at apex. Thorax brown with golden brown scales showing some ornamentation. Abdomen deep brown with median single and double pale scaled areas on the segments and lateral pale areas. Legs brown with narrow basal white bands to the tarsal segments, tibiae with spots and the femora with a white ring towards the apex. Wings with mottled scales.

♀. Head brown with narrow-curved grey scales, brown and pale brown upright forked ones, a border around the eyes of

small pale narrow-curved scales, flat black, then creamy lateral scales. Proboscis deep brown with a pale creamy median area not extending completely around the proboscis to make a band; palpi deep brown, with black chaetae and pale scales apically; antennae pale brown; clypeus deep brown.

Thorax deep brown, with narrow-curved golden scales, showing traces of ornamentation and becoming paler in front of the scutellum and over the roots of the wings; chaetae blackish; scutellum pale brown with narrow-curved pale scales; metanotum brown; pleurae brown with dense flat white scales.

Abdomen brown with median pale creamy scaled areas, on some segments divided into two pale spots, and extending the whole length of the segments, with lateral white lines of scales extending all down the segments; border-bristles brown; venter pale scaled.

Legs brown with the femora yellowish at the base, a white apex and a white ring towards the apex; tibiae deep brown with white spots, first three fore and mid tarsal segments with narrow basal white bands; in the hind legs all the tarsals have narrow basal white bands; fore and mid ungues equal, simple, rather large; hind equal, simple and small.

Wings mottled with creamy and brown scales, the scales



Fig. 220.
Wing of *Taeniorhynchus walsinghamii*. ♀. n. sp.

somewhat denser at the base of the third vein; first sub-marginal cell slightly longer and much narrower than the second posterior cell, its stem very nearly half as long as the cell, its base nearer the apex of the wing; stem of the second posterior, which is broad and long, about half the length of the cell; posterior cross-vein rather more than twice its own length distant from the mid.

Length.—4·5 mm.

Habitat.—Runaway Bay, Jamaica (Lord Walsingham).

Time of capture.—April.

Observations.—Described from a perfect female taken by Lord Walsingham. It bears a very strong resemblance to *T. fasciolatus*, Arribalzaga, but can be told by the mottled wings on which the scales are narrower, by the different venation, especially in the much larger size of the second posterior cell, and by its stem being much shorter than in *fasciolatus*, also by the abdominal adornment.

TAENIORHYNCHUS PERTURBANS. Walker (1856).

Culex perturbans. Walker.

Ins. Saund., p. 428, pt. I. (1856) Walker; Mono. Culicid. II., p. 201 (1901), Theobald; Mosq. N. Jersey, p. 212–216 (1905), Smith; Comp. Rend. d. la Soc. de biol. LIII., p. 567, Laveran (1901); C. R. d. la Soc. de biol. LV., p. 570 (1903), Blanchard and Dye.

Additional localities.—Lake Hopatcong; Cape May; Lahaway in New Jersey (Grossbeck, Viereck, and Brakeley); also Arlington, N. Jersey, Connecticut (H. L. Viereck).

(Walker's locality was merely "United States.")

Observations.—The life-history of this species, which occurs in numbers in some localities in America, is not known, but Dr. Dyar describes the larva.

Professor J. B. Smith, quoting Mr. Brakeley, writes: "As against *perturbans*, undershirt, pants, and drawers are no protection; they will bite clean through all. Nor are they at all timid or deliberate in the attack, but rather at once dive for the nearest point that offers a chance to make a puncture. They have no scruples about entering houses, and for a time formed the only annoying species in Mr. Brakeley's office and bed-room."

The earliest dates of appearance are in May, the latest in August (26th).

They appear at early dusk, coming apparently from vines of trees and against houses, but always from above and always ready to bite. The species sings, and where many of them are about the air is filled with an angry buzz that is quite unlike the angry note of any other species.

Numerous specimens have been examined, and there is no doubt as to the correct identity, which answers in every way to the débris of Walker's type in the Museum, and which was re-described in Vol. II. of this work.

TAENIORHYNCHUS ARGENTEUS. Ludlow (1905).

Canad. Entomo. Vol. XXXVII., p. 98 (1905).

Head dark brown with white curved scales, white and brown flat lateral scales; proboscis with an ochraceous band at base of apical half. Thorax dark brown with white curved scales, with two brown bar-like spots on posterior one-third and two round brown spots near head end. Abdomen dark brown with narrow basal pale bands and some basal lateral white spots. Femora and tibiae speckled; tarsal segments with basal white spots or bands.

"♀. Head dark brown, almost black, covered with white curved scales, white and pale ochraceous forked scales, and a few brown mixed with white flat lateral scales, small white curved scales between the eyes; antennae brown, verticels dark brown, pubescence white, basal segment testaceous; palpi dark brown with a few white scales at the tip; proboscis dark brown, with ochraceous band at basal part of apical half; clypeus dark brown; eyes brown and golden.

Thorax with prothoracic lobes brown, with white curved scales and a few brown bristles; mesonotum dark brown, almost black, with white curved scales, except two ante-scutellar sub-median brown bar-like spots projecting forwards from the scutellum about one-third the length of the mesonotum, and two very small round brown spots near the cephalic end; there are also a few light bristles, but not making distinctly marked lines. Scutellum dark brown with white curved scales and dark bristles, six on posterior border of median lobe, four on each of the lateral lobes; pleurae dark brown, with small bunches of flat white scales; metanotum dark brown.

Abdomen dark brown, narrow basal light (slightly ochraceous) bands, occasionally a few apical light scales, small basal white lateral spots on some of the segments; ventrally mostly light scaled.

Legs: coxae and trochanters dark brown with white scales; all the femora dark brown with a sprinkling of white scales, so as to make them quite speckled, ventrally lighter, and on the mid and fore legs mostly light scaled; tibiae of mid legs markedly speckled, the others darker first tarsal brown on all the legs, with small basal light bands, and the other tarsal segments are also brown, and have small basal light spots, sometimes developed into bands, except the ultimate segment of the hind legs, which is dark throughout. Sometimes these spots or bands are very faint. Ungues equal and simple. Wings clear, rather heavily brown-scaled, especially on the apical half; median scales heavy, clavate, somewhat truncate, lateral scales spatulate, ventral scales slender; ventral scaling usually heavy. Fork-cells short; the first sub-marginal somewhat shorter and narrower than the second posterior; supernumerary cross-vein slightly

shorter than the mid, which it meets; posterior equal to mid and distant twice its own length. Halteres light.

Length.—4 to 4·5 mm.

Habitat.—Angeles Pampanga, Luzon, Philippine Islands.

Time of capture.—September (Miss Ludlow)."

Observations.—This species was described by Miss Ludlow from several specimens taken by Dr. Whitmore.

It is a very distinct species, easily told by the white scaled head and thorax and speckled femora.

Miss Ludlow suggests that it looks like my *T. tenax*, but it is quite distinct.

TAENIORHYNCHUS TENAX. Theobald.

Mono. Culicid. II., p. 199 (1901), and III., p. 258 (1903), Theobald.

var. *maculipes.* Theobald.

First Rept. Gord. Coll. Well. Labs., p. 79 (1905).

Very similar to the type, but with the femora and tibiae of all three pairs of legs with a row of clear white spots on one side.

The banding of the legs passes slightly on to the apices of the preceding segments above, forming apical pale spots. The tibiae and to some extent the femora have black bristles. The wings resemble the type, but there is some variation in the relative lengths of the fork-cells and their stems; in the type of this variety the first sub-marginal cell is considerably longer and narrower than the second posterior cell, its stem less than one-half the length of the cell, its base nearer the base of the wing than that of the second posterior cell; stem of the second posterior cell half the length of the cell; posterior cross-vein about twice its own length distant from the mid.

Length.—6·5 mm.

Habitat.—Kenissa, White Nile and Middle Sobat.

var. *ocellata.* n. v.

Head with pale narrow-curved scales similar to the type, and upright ochreous ones in the middle, a patch behind on each side of flat black scales and black upright forked ones and then flat creamy ones; eyes coppery-red and blue. Thorax as in the type, but with two prominent dark scaled eye-like spots on the pale scaled area and traces of a median one in front; first sub-marginal cell much longer but very little narrower than the second posterior

cell, its stem more than one-third the length of the cell; its base scarcely nearer the base of the wing than that of the second



Fig. 221.
Wing of *Taeniorhynchus tenax*. Theobald. ♀. var. *ocellata*.

posterior cell; stem of the second posterior more than half the length of the wing; posterior cross-vein longer than the mid, rather more than its own length distant from it.

Abdomen with yellow apical bands on the fifth to seventh segments; on the sixth and seventh segments the bands are broken in the middle, thus almost forming two apical spots.

Length.—6·5 mm.

Habitat.—Kuching, Sarawak (Dr. Barker).

Time of capture.—November (Dr. Barker).

Observations.—Described from a single ♀. It resembles the type species, but can be told at once by the two very prominent dark eye-like spots on the pale area of the mesonotum.

This form also apparently occurs in China (vide Vol. III. p. 259).

TAENIORHYNCHUS LINEATOPENNIS. Ludlow (1905.)

Canad. Entomo. XXXVII., p. 133 (1905).

Head brown, with brassy yellow scales in the middle, brown at the sides; proboscis dark brown. Thorax with dark brown scales with a heavy band of brassy-yellow scales at the sides extending in U-shaped form cephalad from base of each wing. Abdomen dark brown, with broad basal bands of dirty-white scales. Legs brown throughout. Wings with brown and light scales.

"♀. Head dark brown, with brassy-yellow curved scales on median portion and extending from occiput to vertex, light bristles projecting forwards, dark brown flat lateral scales and a few forked scales, some light and some dark, on the occiput; antennae dark brown, verticels dark

brown, pubescence also dark, but appearing light in certain positions, basal segment brown; palpi dark brown and quite hairy; proboscis dark brown; clypeus dark brown; eyes brown and silver.

Thorax: prothoracic lobes dark brown, with a few dark brown bristles, no scales; mesonotum dark brown, the median portion covered with dark brown curved scales, bordered by a heavy band of brassy yellow curved scales, extending cephalad from one wing joint (inverted U) across to the other. The brown curved scales on the mesonotum near the scutellum appear in some lights white, and this seems characteristic of the brown scales all over the insect; pleura brown and clothed only with a few brown hairs; scutellum dark brown, with brassy yellow curved scales and a few light bristles; yellow bristles at the wing joint and two sparsely set rows on the mesonotum; metanotum dark brown.

Abdomen dark brown, with broad basal bands of dirty white scales hardly extending the full width of the terga; first segment dark, and the second has merely a median light spot, while on the ultimate segment the band is quite narrow: venter dark.

Legs brown throughout; coxae and trochanters and ventral side of femora somewhat lighter than the rest, a light spot near the apex of fore femora on dorsal side—*i.e.* the ventral colour runs up, but all the scales show much change of colour in different lights; the tibiae and more distal segments are darker, ranging from purplish to fawn colour, according to the angle of the light, and under hand lens may seem even brassy. All ungues equal and simple.

Wings clear, clothed with brown and light typical *Taeniorhynchus* scales. The costa dark throughout; sub-costa and first longitudinal mostly light scaled from the base of the wing to about the junction of the sub-costa, and the stem of the fifth long vein is also light, with some light scales on the lower fork.

The scales vary much in different lights, the colours ranging from a grey to dirty white to brassy yellow, and the effect is of two light diverging lines on the wing; fringe dark, turning grey in some lights, first submarginal is a fourth longer and a little narrower than the second posterior, the supernumerary cross-vein about half as long as the mid, and distant twice its own length; halteres have a light stem and dark knob.

Length.—3·5 mm.

Habitat.—Camp Gregg, Bazambang Pangasinan, Luzon, Philippine Islands.

Time of capture.—September (13th and 14th)."

Observations.—Described from two perfect specimens sent by Captain Chamberlain marked "inside screens of screened houses" (Miss Ludlow).

Genus **CHRYSOCONOPS.** Goeldi.

Os. Mosq. no Para., p. 114 (1905).

The head, thorax and abdomen scaled as in *Culex*. Colours golden-yellow and metallic violet. Large species. Male palpi long, acuminate, dense hair-tufts. Male genitalia with short basal lobes and broad claspers with short acuminate terminal segment, harpogones stout and curved with thick spines.

The wing scales dense and *Taeniorhynchus*-like, but the majority end asymmetrically.

Goeldi finds that the eggs of *fulvus* are short, broad in the middle and taper to a blunt point at each end, almost rhombic in shape. They are laid detached, in a double row which soon becomes disarranged.

Nine species are known as follows:—*fulvus*, Wiedemann; *conopas*, Frauenfeld; *annettii*, Theobald; *aurites*, Theobald; *acer*, Walker; *brevicellulus*, Theobald; *ochraceus*, Theobald; *fuscopennatus*, Theobald, and *cristatus*, Theobald.

Chrysoconops cristatus. Theobald (1905).

Taeniorhynchus cristatus. Theobald.

First Rept. Gord. Coll. Well. Labs., p. 78 (1905).

Thorax shiny black, with golden hair-like curved scales. Abdomen orange. Legs black and orange, with tufts of black scales especially on the middle of the hind tibiae.

♀. Head brown, with pale yellow narrow-curved scales, and long, black, bifid, upright, forked scales over the occiput, and a tuft of stout brown bristles projecting forwards; antennae brown, the four basal segments reddish. Proboscis and palpi yellowish, with black apices.

Thorax black with narrow hair-like curved golden scales, pleurae with a few white patches; on the mesonotum lateral rows of long stout black bristles; scutellum black, with hair-like golden scales and black border-bristles.

Abdomen entirely orange with orange-yellow scales, above and below. Legs yellow, with black tufts, very inconspicuous on the forelegs, more like banding at the femoro-tibial and tibio-metatarsal joints; the second pair the same, but more marked, femur spotted with black, the last segment of tarsus black; the hind legs similar to the mid, but with bright purple to black tufts

in the middle of the tibiae, consisting both of scales and bristles; apical half of the first tarsal black; nearly two-thirds of the apical half of the second tarsal and the third tarsal black, last tarsal black with yellow basal band at the joint; ungues of fore and mid legs long, equal and simple, of the hind small, equal, and simple.

Wings with yellow costa and veins, and yellow and dark scales, the yellow scales more rounded at the apex than the dark ones, some slightly expanded; most of the dusky scales are acutely truncated. First sub-marginal cell very long, longer than the second posterior cell; fringe dark. Halteres pale yellow, with pale knobs.

Length.—6 mm.

Habitat.—Pibor.

Observations.—A single specimen only taken. The description is mainly that sent me by Dr. Balfour; the type was much damaged in transit, but I have added a few notes to those he has sent me. It is certainly a new species, easily identified by the tuft of purple black scales and bristles on the hind legs.

CHRYSOCONOPS FUSCOPENNATUS. Theobald (1903).

Taeniorhynchus fuscopennatus. Theobald.

Mono. Culicid. III., p. 265 (1903).

Additional locality.—Bukedi country, beyond Lake Kioga. It is one of the most abundant Central African species.

Notes.—The habits according to Dr. Christy are peculiar in many ways. In swampy regions it bites at any time of the day, more particularly in dull and wet weather. It is the only mosquito Dr. Christy has found in Africa that can be said to fly to a light. Clouds of them may be seen in the daytime, and quite a halo of them will surround any lamp placed in the open at night. The bite is not painful, and produces no subsequent irritation.

CHRYSOCONOPS BREVICELLULUS. Theobald (1903).

Taeniorhynchus brevicellulus. Theobald.

Mono. Culicid. II., p. 212 (1901) and III., p. 268 (1903).

Additional locality.—Ceylon (E. E. Green).

CHRYSOCONOPS AURITES. Theobald (1901).

Taeniorhynchus aurites. Theobald.

Mono. Culicid. II., p. 209 (1901) and III., p. 269 (1903).

Additional localities.—Entebbe, Uganda (Dr. Moffat); Kuala Lumpur, Federated Malay States (Dr. Durham, 10. xi. 02 and 25. v. 02).

CHRYSOCONOPS FULVUS. Wiedemann (1828)—Goeldi.

Culex fulvus. Wiedemann (1828).

Taeniorhynchus fulvus. Wiedemann—Theobald.

Culex ochripes. Macquart (1850).

Culex flavicosta. Walker (1856).

Psorophora fulvus. Weidemann—Coquillett (1906).

Auss. Zweiflug. Ins., p. 546 (1828), Wiedemann; Dipt. Exot. Nov. ou peu connus. Supp. 4, p. 11, 15, pl. V., Fig. 1. Macquart (1850); Ins. Saund., p. 431 (1856), Walker; Class. Mosq. N. and M. America, Tech. Sc. 11, U.S. Dept. Agri., p. 14 (1906), Coquillett; Os Mos. no Para., p. 112 (1905), Goeldi.

A large number of specimens have been received from Professor Goeldi from various parts of Brazil. He also figures the eggs (Plate H), and on this species he founded the genus *Chryso-*

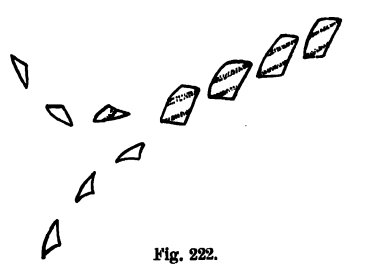


Fig. 222.

Ova of *Chrysoconops fulvus* as laid and breaking up (after Goeldi). (Enlarged.)

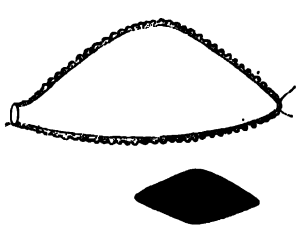


Fig. 223.

Ova of *Chrysoconops fulvus* (after Goeldi). (Greatly enlarged.)

conops. Mr. Coquillett referred this very distinct species to *Psorophora*, but it is totally distinct from any of the four *Psorophoras* I have examined, and in a recent communication Mr. Coquillett agrees that it comes in another genus.

GENUS **MANSONIA.** Blanchard (nov. nom.).

PANOPLITES. Theobald.

Taeniorhynchus. Arribalzaga.

Mono. Culicid. II., p. 173 (1901) and III., p. 269 (1903) Theobald; C. r. Soc. Biol., Paris, No. 37, Vol. LIII., p. 1046 (1901), Blanchard (nov. nom.); Dipt. Argent., p. 47 (1891), Arribalzaga.

This genus was founded on Walker's *Culex titillans* on account of the broad wing scales.

Arribalzaga founded the genus *Taeniorhynchus* on *Culex taeniorhynchus*, Wiedemann, and made *Culex titillans*, Walker, *Culex sollicitans*, Walker, and *Culex damnosus*, Say, synonymous. The first three are totally distinct and clearly come in three separate genera. I fear however that Arribalzaga has described Walker's *titillans* as *Culex taeniorhynchus*, and certainly figures a *Mansonia*



Fig. 224.
Ova of *Mansonia titillans*. Walker. (After Goeldi.)
(Greatly enlarged.)

scale 4D, Pl. II. If this is so *Mansonia* must sink as a synonym of *Taeniorhynchus*, Arribalzaga (non mihi, Felt, Blanchard, etc). For the present it is left as in the previous volumes. In any case Arribalzaga's genus was made to contain totally distinct insects, such as *titillans*, Walker, or *taeniorhynchus*, Wiedemann, and *fasciolatus*, Arribalzaga. If this is so then the genus *Mansonia* must be called *Coquillettidia* of Dyar.

MANSONIA SEPTEMPUNCTATA. Theobald (1905).

Ann. Mus. Nat. Hung. III., p. 187 (1905).

Head brown with scattered grey scales and a grey border around the eyes and grey flat scales laterally, with black upright forked scales; proboscis with a broad yellow band, apex with a few pale scales; palpi brown with white apex. Thorax brown with bright reddish-brown scales and with seven pale puncta, three in front near nape and then two lateral pairs; scutellum pale. Abdomen with apical silvery patches. Legs spotted.

♀. Head brown with narrow-curved silvery grey scales, dense along the borders of the eyes, flat grey lateral ones and numerous black upright forked scales; palpi testaceous with brown scales and snowy white apex; clypeus bright brown; proboscis brown scaled, the middle with a broad yellow scaled band and a few pale scales at the apex; antennae deep brown, with narrow pale bands at the verticels, basal segment bright ochreous, second segment less so, with black scales; the frons distinctly produced between the antennae as in *Runchomyia*.

Thorax deep brown with small narrow-curved rich bright brown scales, with three silvery white scaled spots in front near the neck and two lateral pairs behind, there are also scattered silvery scales over and behind the roots of the wings and around the bare space in front of the scutellum, bristles dense deep brown and black; scutellum brown, the mid lobe very large and prominent, densely clothed with narrow-curved dull silvery scales, border-bristles long, black, six to the mid lobe; metanotum deep brown; pleurae brown with a patch of flat silvery white scales.

Abdomen deep brown, the two basal segments with median yellow scaled spots, apical lateral silvery white spots to the segments which, on the last two, spread out on to the dorsum, so that more of the surface is white scaled; posterior border-bristles golden brown; venter with the segments basally ochreous, white apically.

Legs brown, spotted and banded with white as follows:—Fore femora with five white spots on one side, two on the other, apex white, base yellowish, fore tibiae with five white spots and a broad yellow apex; first tarsal with a median white spot, second and third tarsals with a dorsal basal white spot, last two segments ochreous brown, unspotted; mid femora and tibiae the same, and also the tarsals; hind similar but with traces of pale basal spots on all the tarsals; ungues equal and simple.

Wings with brown and yellow scales; fork-cells long, the first sub-marginal a little longer and slightly narrower than the second posterior, its base a little nearer the apex of the wing, its stem more than half the length of the cell, stem of the second posterior cell more than half the length of the cell; posterior cross-vein nearly three times its length distant from the mid; border scales small (not *Mansonia*-like).

Length.—4·5 mm.

Habitat.—Friedrich-Wilhelmshafen, New Guinea (Biró, 1901).

Time of capture.—November.

Observations.—Closely related to ***M. annulipes***, Walker, but the thorax is distinct, having seven pale spots. The whole insect is of a reddish-brown hue, not dark blackish-brown as in ***annulipes***.

MANSONIA UNIFORMIS. Theobald (1901).

Panoplites uniformis. Theobald (1901).

Panoplites africanus. Theobald (1901).

Panoplites australiensis. Giles (1903).

Mono. Culicid. II., p. 180 (*uniformis*), and p. 187 (*africanus*) (1901), Theobald; Handbk. Gnats, p. 355 (*australiensis*), Giles (1903); C. R. de la Soc. d. biologie LV., p. 570 (1903), Blanchard and Dye; Ann. Mus. Nat. Hung. III., p. 107 (1905), Theobald; Les Moust., p. 379 (1905), Blanchard.

New localities.—Philippine Islands (Miss Ludlow): Dilo, Ins. Graget, Friedrich-Wilhelmshafen, New Guinea (Biró); Ivory Coast (Drs. Blanchard and Dye); Madagascar (Drs. Ventrillon and Blanchard).

MANSONIA ANNULIFERA. Theobald (1901).

Mono. Culicid. II., p. 183 (1901), and III., p. 274 (1903), Theobald; Proc. Roy. Soc. Eng. LXIX., p. 392 (1902), Theobald; Handbk. Gnats, 2nd Ed., p. 356 (1902), Giles; Les Moust., p. 380 (1905), Blanchard.

New locality.—Philippine Islands (Miss Ludlow). Caught in the woods, hospital and quarters by Dr. Whitmore.

MANSONIA SEGUINI. Laveran (1901).

Panoplites seguini. Laveran.

C. R. de la Soc. de Biol. LIII., p. 991 (1901).

Habitat.—Hanoi, Tonkin, in the military hospital. July–September. Sucks blood.

I cannot see any specific differences from *uniformis* in the description given by M. Laveran. No specimens have been received.

MANSONIA (?) NIGRA. Theobald (1906).

Second Rept. Well. Resh. Labs., Gord. Coll., Khartoum, p. 80 (1906).

Thorax very dark brown with dark brown scales and golden scales forming an irregular ornamentation. Proboscis black with

a narrow white band towards its base. Abdomen black with somewhat irregular, narrow white bands and a few scattered white scales and golden bristles. Legs deep blackish-brown, with some of the segments with narrow white basal bands and a few scattered pale scales over the larger segments. Wings with very deep brown and white scales.

♀. Head deep blackish-brown, clothed with rather broad pale narrow-curved scales on the occiput, smaller narrow-curved golden ones around the eyes and pale upright forked scales, the sides with grey and black flat scales. Proboscis black scaled, with a narrow white band towards its base and a few white scales here and there on the apical part; palpi rather swollen apically, clothed with deep black scales and with two irregular narrow bands of white scales on the basal half; clypeus black; antennae very deep brown with brown verticillate hairs, basal segment deep black with grey sheen around the summit, and with some small flat creamy scales.

Thorax deep blackish-brown, clothed with narrow-curved bronzy-brown scales and irregularly ornamented with broader narrow-curved golden scales, with broad narrow-curved white and black scales at the sides just before the roots of the wings, a marked pale area in front of the roots of the wings and pale scales on each side of the bare space in front of the scutellum, much denuded, deep blackish-brown with curved pale golden scales on the mid lobe, with apparently a few flat pale ones basally, side lobes with a few flat black scales; metanotum deep brownish-black; pleurae deep brown with small flat creamy scales.

Abdomen densely clothed with flat black scales, with irregular apical, very narrow bands of white scales, the last few segments with traces of median lateral creamy patches and a few scattered pale scales over all the segments.

Legs black scaled, the first four tarsal segments of all the legs with narrow white basal bands and a few pale scattered scales on all the femora and tibiae; ungues equal and simple.

Wings with large black and white *Mansonia* scales, those on the sixth vein large and irregularly heart-shaped; posterior border-scales of the fringe large with long apical serrations, continuations of the scale ribs; first sub-marginal cell longer and narrower than the second posterior cell, their bases nearly level; stem of the first sub-marginal rather more than one-third the length of the cell; stem of the second posterior rather more than

two-thirds the length of the cell; posterior cross-vein about twice its own length distant from the mid.

Length.—4·3 mm.

Habitat.—Sudan, Blue Nile (Mr. Friedrichs).

Observations.—A very dark species, looking almost black, with paler markings. The wing scales present a slight modification in



Fig. 225.
Wing of *Mansonia* (?) *nigra*. ♀. Theobald.

certain areas to the true *Mansonia* type, but most are normal. Those on the sixth vein are very large and irregularly heart-shaped.

Unfortunately the scutellum was partly denuded, but as far as I can detect there are a few flat scales on the lateral lobes left and a few at the base of the mid lobe. If these are in their normal position the species must form the type of a new genus. As there were some other detached scales on the scutellum, clearly head scales, it may be that the flat ones are also stray scales from another part of the body.

The species is very marked, but the exact generic position must be left *pro tem.* It probably comes in the next genus.

Dr. Balfour, who sent the specimen, pointed out that there were bluish purple and green scales laterally on the abdomen. These could not be detected, probably owing to fading after death.

Genus **MANSONIOIDES.** nov. gen.

Head clothed with narrow-curved scales, numerous upright forked scales and flat lateral ones. Palpi of ♀ rather long. Mesothorax clothed with narrow-curved scales. Scutellum clothed with flat scales on the mid lobe, narrow-curved ones on the lateral lobes. Wings with dense asymmetrical broad flat scales as in Mansonia, with some large lanceolate ones beneath them.

Closely related to *Mansonia* but separated at once by the flat scutellar scales.

MANSONIOIDES SEPTEM-GUTTATA. n. sp.

Head mottled golden and brown with a pale border around the eyes. Thorax golden brown with seven silvery spots and silvery scutellum. Abdomen brown with scattered ochreous scales, with lateral patches and many white scales over apex. Legs much banded with yellowish brown, deep brown and white. Wings mottled with brown and yellow scales.

♀. Head brown, clothed with narrow-curved pale golden scales, silvery white ones around the eyes, flat creamy lateral ones and brown upright forked scales. Palpi clothed with ochreous scales black at their apices, apex of palps with dense white scales and a few lower down, also some short black chaetae; proboscis ochreous with brown scales at the base and apex; antennae banded with dark and yellowish brown, second segment with many flat dusky scales.

Thorax bright and dark brown, clothed with narrow-curved scales, with seven round silvery spots, two in front, two about the middle of the mesonotum, one at the base of each wing and another between these, the last three not so distinct as the two anterior pairs; scutellum with flat silvery scales to the median lobe, narrow-curved silvery ones to the lateral lobes; four brown chaetae to posterior border of the mid lobe; metanotum brown; pleurae ochreous with scattered creamy scales and a large spot beneath the wing.

Abdomen clothed with large brown scales, with lateral snow-white patches situated medianally, the last two or three segments with many pale ochreous or white scales; basal segments with pale ochreous scales and pallid hairs.

Legs ochreous, clothed with ochreous scales tipped with black, giving a mottled appearance and all the segments banded with snow white; fore femora with five white bands and white apex, fore tibiae with five white bands and white apex, first fore tarsal with median white band, next two tarsals with basal white bands; mid and hind femora as the fore; mid tibiae with five white bands, apex unbanded and with two or more small white spots between the bands, first tarsal with basal and median band, the next two tarsals with basal white bands; hind tibiae with four white bands, basal two small; first tarsal as in mid legs, all the tarsals with basal white bands; ungues equal and simple.

Wings with dense *Mansonia* scales, the majority brown, some scattered yellow ones especially basally and along the costa and sub-costa; first fork-cell longer and narrower than the second



Fig. 226.
Wing of *Mansonioides 7-guttata*. (♀.) n. sp.

posterior, its base nearer the apex of the wing, its stem more than half the length of the cell, stem of the second posterior about two-thirds the length of the cell; posterior cross-vein about two and a half times its own length distant from the mid; the



Fig. 227.
Another wing of *Mansonioides 7-guttata*. (♀.) n. sp.

sixth vein close to the fifth; the border-scales of the fringe of two series, one row large and broad and running parallel with the edge of the wing, another sloping forwards, narrower and longer.

Length.—4·8 to 5·5 mm.

Habitat.—Sarawak (Dr. Barker).

Observations.—In general appearance this species is very like both *Mansonia annulifera* and *Mansonia septemguttata*, but it can at once be told by the seven spots on the thorax from the former and from their different distribution from the latter, but most of all by the flat white scaled mid lobe of the scutellum, which character clearly places it in a new genus.

Genus **LEPIDOPLATYS.** Coquillett.

Science, XXIII., p. 314 (1906).

Head clothed with very large curved scales on occiput, very small lateral flat scales and numerous fimbriate forked upright scales, all arranged in a very irregular manner, giving a ragged appearance as in *Acartomyia.*

Thorax with narrow-curved scales and much broader ones laterally, also on the scutellum.

Wings mottled, with large, broad, rather acute triangular scales, with either flat or irregular fimbriated apical borders, the apex of the wings with rather broad, long, lateral vein scales. The male has the second posterior cell short but very broad.

Female palpi rather long, the male with the two distal segments slightly swollen and with hair-tufts.

The wing scales at once separate this genus from any other *Culicine.* It comes between *Mansonia* and *Etorleptiomyia.*

Two species so far known, one described by Coquillett as a *Culex* and referred by Felt to *Culicada.* It does not bear any affinities to either genus. Unless the very marked squamose characters of the wings are examined one might mistake it for a *Grabhamia.* The second species, *L. sylvicola,* Grossbeck, has been mistaken for *squamiger.**

Lepidoplatys squamiger. Coquillett (1904).

Culex squamiger. Coquillett.

Culicada squamiger. Coquillett.

Culex squamifer. Blanchard (1905).

Grabhamia de niedmannii. Ludlow (1904).

Ento. News, XV., p. 80 (1904), Coquillett; Mosq. N. Jersey, p. 221 (1904), Smith; Bull. 79, Ent. 22, p. 391 c. (1904) (*Culicada squamiger*), Felt; Canad. Ent. XXXVI., p. 234 (1904); (*Grabhamia de Niedmanni*), Ludlow; Les Moust., p. 630 (1905) (*C. squamifer*), Blanchard.

Head covered with grey scales; proboscis and palpi black with a few white scales. Thorax ornamented; dark brown in the middle with a few pale scales becoming rich brown in front, silvery-grey at the sides, and broadest in front. Abdomen dark brown with scattered yellow scales and basal white bands. Legs

* Vide Canad. Ent. XXXVIII., p. 129 (1906).

dark brown, speckled, with basal white bands. Wings densely scaled with deep brown and white scales.

♀. Head densely clothed with irregularly arranged scales giving a ragged appearance, the median ones curved broadly scimitar-shaped, creamy-grey, at the sides smaller and grey, black and ochreous, then small flat ones forming a black central spot surrounded with white, the upright forked scales in the middle creamy-white, the lateral black, some with fimbriated ends, others simply forked; chaetae black and golden-brown; palpi densely black scaled, with a few grey ones, especially apically and black bristles, scales outstanding; proboscis black, with a few scattered white scales, especially on basal half; scapus of antennae brown, with small flat creamy scales on inner aspect, basal

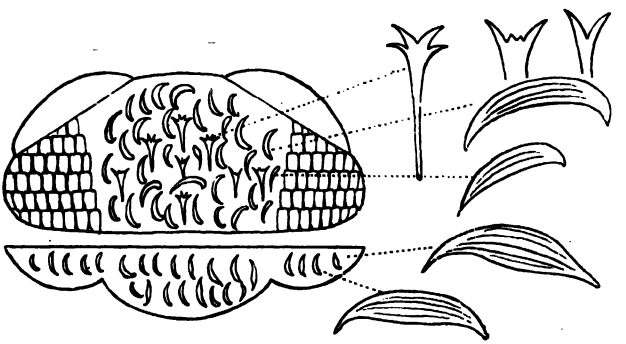


Fig. 228.

Cephalic and scutellar ornamentation of *Lepidoplatys squamiger*. ♀. Coquillett.

segments of flagellum bright testaceous; verticillate hairs black; clypeus dark brown.

Thorax black, median area clothed with very narrow uniformly backwardly projecting scales which are bright golden-brown in front, darker behind, which in front of the scutellum become broader and mixed with pale scales, at the sides the scales are much broader, silvery-white, in front with a bright brown median patch, the white scales forming a well-defined area much closer together in front than behind; bristles black and golden; scutellum densely clothed with large irregular white curved scales and long dark-brown and golden border-bristles; pleurae dark brown with patches of flat white scales; metanotum black.

Abdomen clothed with deep blackish-brown scales with scattered ochreous ones and broad basal white bands, the apical

segments with narrow apical white borders as well; posterior border-bristles pale golden; venter mostly white scaled.

Legs black with scattered white scales on the femora, tibiae and first tarsals; base of femora bright testaceous, a basal white band on the first tarsals, and on the second, third and fourth fore and mid tarsals; broader areas to all the segments of the hind legs; all the ungues large, black, equal and uniserrate.

Wings clothed with large triangular scales with fimbriated apices and with broad linear lateral scales on the apical area as well, scales black and white; first sub-marginal cell longer and narrower than the second posterior cell, their bases nearly level, stem of the first sub-marginal one half the length of the cell;



Fig. 229.
Wing of *Lepidoplatys squamiger*. ♀. Coquillett.

stem of the second posterior nearly as long as the cell; posterior cross-vein nearly its own length from the mid cross-vein. The fringe is very dark. Halteres with fuscous base and knob, middle of stem testaceous, knob clothed with small flat grey scales.

Length.—5 to 5·5 mm.

♂. Thorax, abdomen, and legs much as in the ♀. Palpi dark brown, with patches of white scales and brown hair-tufts; the two apical segments slightly enlarged. Plume-hairs of antennae brown and golden. Proboscis brown. First fork-cell much longer and narrower than the second, its base nearer the apex of wing, its stem more than two-thirds the length of the cell; the second posterior cell is *very broad*, its stem longer than the cell; posterior cross-vein about half its own length distant from the mid; there are signs of fuscous markings running longitudinally at the base.

Length.—5 mm.

Localities.—California, New Jersey (H. L. Viereck), at Westville and New Brunswick, in May, June, July; and at Paterson.

Observations.—This species was described by Mr. Coquillett from specimens taken in California. In New Jersey they always seem associated with *Culex canadensis*, Theob., when flying, and have approximately the same habits of flying and bite readily, but their bite is no more venomous than that of other species, nor do they bite more readily. They seem to prefer damp, swampy woodlands, and in New Jersey none have been taken outside the woods, and there they seem to be rare. Prof. J. B. Smith

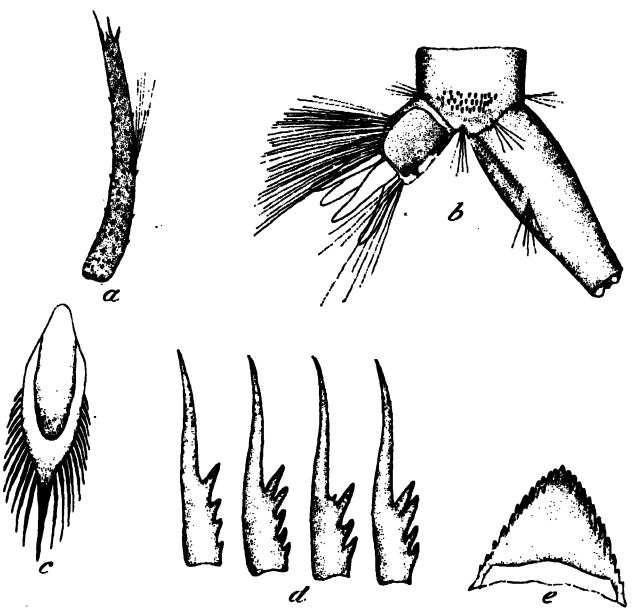


Fig. 230.

Lepidoplatys squamiger. Coquillett.

a, Antenna; b, siphon and anal segment; c, scale from comb of 8th segment; d, scales of siphon pecten; e, labial plate. (After Smith.)

states (p. 124) that there is only one brood, and that the flight is long, probably three months.

I have redescribed the species from specimens sent me by Prof. E. P. Felt, so as to show its true position.

The larval characters here described are partly taken from Professor J. B. Smith's work on New Jersey Mosquitoes.

Larva.—Length 12 to 15 mm. Colour grey to dull yellowish grey (spirit specimen). Antennae short, simply curved, dusky brown, with short stiff thorn-like spine, most numerous at the

base; lateral tuft just below the middle of the antennae; apex with two spines, one longer than the other and two bristles; labial plate with 12 to 15 (12 to 14, Smith) teeth on each side of apex. Scales on eighth abdominal segment 28 to 34, no definite arrangement; each scale has a large apical spine, and the others decrease from it basally. Anal siphon four times as long as wide; with two series of toothed spines, each ranging from 17 to 22, these are jet black with paler tips (J. B. Smith says white, probably in live specimens), each spine having four teeth on one side, some in two distinct pairs, but not all; anal gills nearly as long as ninth segment, bluntly acuminate.

Habits of larvae.—Mr. Grossbeck found these larvae with those of *Culex canadensis* in April at Paterson, New Jersey. In May they are again recorded by Prof. J. B. Smith as occurring with *canadensis*, a male *squamiger* emerging on May 8th. Nothing is known further of their habits at the time of going to press.

It comes in a very distinct genus. No *Culicid* has been seen like it from any part of the world.

As there is only one ♂ no attempt has been made to describe the genitalia and ungues.

Coquillett gives Miss Ludlow's *niedmannii* as a synonym of this species, and I understand from Miss Ludlow that she agrees in this respect.

Genus **ETORLEPTIOMYIA.** Theobald.

O'Reillia. Ludlow.

First Report, Gord. Coll. Well. Labs., p. 71 (1904); Gen. Ins. Fam. Culicid., p. 44 (1905), Theobald; Canad. Ento. XXXVII., p. 101 (1905); Gordon Coll. Lab. 1st Report, p. 71 (1904).

Head clothed with a mixture of narrow-curved scales, upright forked ones and small loose flat scales all over; antennae scaly on the basal segments. Thorax with scales of mesonotum narrow and curved, those of the scutellum flat and small. Abdomen clothed with flat scales. Wings with very marked heart-shaped scales on the basal halves of the second, fourth, fifth and sixth veins; on the first long vein, base of second and fourth also with more or less *Mansonia*-like scales and along costal border also, scales on the apical halves of the veins pedunculated, clavate, peduncles very short; costa spiny; fork-cells moderately long.

This forms a very distinct genus, easily told by the curious heart-shaped scales on the wings. The proboscis seems very weak. The *Mansonia*-like scales are not exactly as in that genus, but approach them very closely.

Two species are known in this very marked genus, namely :— *E. mediopunctata*, Theobald, Gordon Coll. Well. Lab. Reports, p. 71 (1904), Sudan ; and *E. luzonensis*, Ludlow, Canad. Ento. XXXVII., p. 101 (1905).

ETORLEPTIOMYIA LUZONENSIS. Ludlow (1905).

O'Reillia luzonensis. Ludlow.

Canad. Entomo., Vol. XXXVII., p. 101 (1905).

Head dark with almost white scales ; proboscis mostly yellow, base and narrow apical rim brown. Thorax brown, white scales on the prothorax, brown and white on scutellum. Abdomen covered with dark brown and orange yellow scales, speckled appearance. Legs with speckled yellow and brown femora and tibiae ; fore tarsal segments light with faint brown spots ; hind, light brown with some paler basal bands.

♀. Head dark, covered with light (almost white) curved scales, very broad forked scales having markedly fimbriate (under two-thirds inch objective denticulate) apices, which in some lights are white, a white rim around the eyes and flat white lateral scales ; antennae dark, verticels and pubescence light, basal segment testaceous with a few small, flat, white scales, palpi extremely small, dark, with a few white scales at the tip ; proboscis mostly yellow scaled, the base and a very narrow rim at the apex being dark brown ; clypeus brown ; eyes brown.

Thorax brown ; prothoracic lobes with flat, somewhat spindle-shaped white scales ; pleurae testaceous ; scutellum brown, with brown and white, rather long, flat scales on the mid lobe, lateral lobes with white flat scales ; metanotum brown.

Abdomen light, covered with dark brown and orange yellow flat and somewhat spatulate scales, irregularly placed so as to be speckled ; venter rather lighter than dorsum, but speckled ; light apical hairs.

Legs all light ; coxae and trochanters covered with brown and yellow scales ; femora and tibiae speckled yellow and brown, and are darker than the rest of the legs, ventral side lighter ; fore tibiae dark, tarsal segments light with faint brown spots ; mid tibiae are dark near apex, and the tarsal segments are

all light, with faint light brown spots on some of the segments; hind tibiae dark near apex, first tarsals light and the rest brown, *i.e.* pale brown with light basal bands on the second, third and fourth segments, the fifth segment covered entirely with light brown scales. Ungues simple and equal.

Wings clear, covered with brown and white (or light yellow) broad scales, the apical ends truncate and notched; the ventral scales obovate or clavate and very thin and white. There seems to be no arrangement into spots, the wing being simply "speckled." First sub-marginal cell is nearly twice as long and a little narrower than the second posterior cell, its stem being about one-half the length of that of the posterior; mid and supernumerary cross-veins are about equal and meet, the posterior cross-vein nearly twice as long, and a little more than its own length distant. On the costal edge the scales show something of the spinous shapes found in *Uranotaenia*. Halteres pale.

Length.—3·5 to 4 mm.

Habitat.—Bazambang, Pangasinan, Luzon, Philippine Islands.

Time of capture.—September 11th.

Observations.—This species was placed by Miss Ludlow in a new genus, *O'Reillia*, she not knowing at the time of the genus *Etorleptiomyia*, through my delay in sending the paper defining it. The specimen was sent her by Captain Chamberlain from Camp Gregg with a note, "Outside screens of screened house. Rainy night."

It is evidently a very marked species of *Etorleptiomyia*.

Genus **MELANOCONION.** Theobald.

Mono. Culicid. III., p. 238 (1903); Genera Ins. Fam. Culicid., p. 32 (1905).

Additional observations on habits, etc.—Professor Glenn Herrick* states that "the larvae and pupae occur abundantly in ponds and ditches when the water contains plenty of algae. I have taken larvae in deep water among surface algae about an old log. They are remarkable for their long respiratory tubes which are dark on the distal fourths. The anal flaps are long and slender. The antennae are covered (sparsely) with short dark spines, and at the offsets, about two-thirds of their length, is

* Ento. News, p. 282, Nov. 1905.

a whorl of many much-branched bristles. The ends of the antennae are beset with four stiff black spines. The antennae are black at the bases and on the distal thirds from the offsets."

MELANOCONION ORNATUS. Theobald (1905).

Ann. Mus. Nat. Hung. III., p. 100 (1905).

Head black, with some median yellowish scales; palpi and proboscis black. Thorax deep rich brown, ornamented with two parallel pale scaled lines behind, pale golden scales at the sides, and pale scales in front and on the scutellum. Abdomen deep brown with pale basal lateral spots, venter densely creamy-scaled. Legs bronzy-brown, unbanded.

♀. Head deep brown with small dusky narrow-curved scales, some dull yellowish ones in the middle and small dusky-grey flat ones at the sides, a few dusky and dull ochreous upright forked ones; palpi and proboscis black; antennae deep brown; some long black bristles on the palpi and short ones on the proboscis.

Thorax deep chestnut-brown with very small narrow-curved scales, two pale scaled lines on the posterior half running down to the scutellum, golden scales at the sides in front of the wings and extending to the head and some golden scales in front; scutellum brown with pale creamy narrow-curved scales; metanotum deep brown; pleurae brown with yellowish tinge.

Abdomen deep brown with basal creamy lateral spots which on some of the segments nearly meet to form indistinct basal bands; border-bristles pale golden in some lights, brown in others; venter covered with creamy scales.

Legs thin, deep brown, the coxae and bases and femora beneath deep ochreous; ungues small, equal and simple.

Wings with brown scales, fork-cells short, the first sub-



Fig. 231.
Denuded wing of *Melanoconion ornatus*. ♀. Theobald.

marginal with dense thick scales, also the first longitudinal and to some extent the third long vein; first sub-marginal cell longer

and narrower than the second posterior cell, its stem nearly two-thirds the length of the cell, its base nearly level with that of the second posterior cell; stem of the second posterior nearly as long as the cell; posterior cross-vein a little longer than the mid, nearly twice its own length away; halteres with pale stem and fuscous knob.

Length.—3·5 mm.

Habitat.—Friedrich-Wilhelmshafen, New Guinea (Biró, 1900).

Time of capture.—December.

Observations.—Described from a single ♀. It can at once be told from all other *Melanoconions* by the ornamentation of the thorax. Type in the National Museum, Budapest.

MELANOCONION PALLIDICEPS. Theobald (1905).

Ann. Mus. Nat. Hung. III., p. 101 (1905).

Head silvery-grey, dark behind; palpi of ♂ and proboscis brown. Thorax brown, with two dark median lines in front and a dark patch on each side behind, with small bronzy scales; pleurae testaceous. Abdomen deep brown, unbanded, venter with creamy scales. Legs brown, with bronzy reflections, coxae and under surface of femora grey.

♂. Head deep brown, with pale narrow-curved scales and flat pale scales at the sides and numerous black upright forked scales, most dense behind; palpi deep brown, longer than the proboscis, the two distal segments nearly equal, both with black hairs on each side; proboscis deep brown, swelling apically; antennae brown, with flaxen-brown plumes.

Thorax brown to slaty-grey, with two broad dark lines in front and a large brown patch on each side behind over the roots of the wings, with small scattered pale golden to bronzy scales; scutellum brown, with narrow-curved pale scales; metanotum deep brown; pleurae ochreous brown.

Abdomen brown, with deep brown scales unbanded, hairy, hairs blackish; genitalia ochreous, with yellowish hairs; venter with traces of basal pale bands.

Legs brown, unbanded, with ochreous reflections, coxae ochreous, femora beneath, pale creamy; fore and mid ungues, unequal and uniserrated, the hind equal and simple.

Wings with the fork-cells short, the first sub-marginal a little longer and much narrower than the second posterior, its stem as long as the cell, its base slightly nearer the apex of the wing,

stem of the second posterior as long as the cell; posterior cross-vein sloping backwards, about twice its own length distant from the mid, the mid and supernumerary nearly in a straight line. Halteres with pale brown stem and fuscous knob.

Length.—4 mm.

Habitat.—Friedrich-Wilhelmshafen, New Guinea (Biró, 1900).

Time of capture.—December 27th.

Observations.—Easily told by the white scaled head and thoracic ornamentation on the integument.

Type in the National Museum of Hungary, Budapest.

MELANOCONION MELANURUS. Coquillett (1902).

Culex melanurus. Coquillett.

Journ. N. Y. Ent. Soc. X., p. 193 (1902), Coquillett; Journ. N. Y. Ent. Soc. X., p. 198, pl. XVII., fig. 1 (1902), Dyar; Mosq. N. York State, Bull. 79, Ent. 22, N. Y. St. Mus., p. 337 (1904), Felt.

Head grey in front, dark brown behind; male palpi slightly longer than the brown proboscis. Thorax rich umber-brown. Abdomen deep brown unbanded, no traces of lateral pale spots; hairy. Legs brown unbanded.

♂. Head deep brown, clothed with scanty *very* narrow-curved pale greyish scales in front and on occiput, dusky ones behind with numerous black upright forked scales, most numerous at the back of the head, forming the dark area mentioned above; small lateral flat scales, white to creamy; palpi deep brown, apical segment acuminate, about two-thirds the length of the penultimate and thinner, both with long brown hairs and two or three long bristle-like hairs on apex of the antepenultimate. Proboscis deep brown; antennae deep brown, with grey internodes and deep brown plume-hairs with grey apices.

Thorax deep rich reddish-brown, with scanty, very small curved, almost hair-like golden scales and numerous black bristles, which show golden reflections; scutellum deep brown, with black border-bristles and small very narrow-curved dull golden scales; metanotum brown; pleurae deep brown, with a few dull grey patches of scales.

Abdomen deep brown, unbanded, fifth, sixth and seventh segments much swollen; the whole abdomen densely hairy, hairs brown.

Legs deep brown, unbanded, base and under surface of

femora pale grey; fore and mid ungues unequal, both uniserrate, hind equal and simple, much curved.

Wings with dense thick scales as in *M. indecorabilis*; fork-cells small, the first sub-marginal much longer and a little narrower than the second posterior, its stem rather less than one-fourth the length of the cell, its base nearer the base of the wing than that of the second posterior cell; stem of the second posterior cell about two-thirds the length of the cell; posterior cross-vein nearly twice its own length distant from the mid.

Halteres pale, with slightly fuscous knob.

Length.—3·8 to 4 mm.

Habitat.—New Hampshire (D. W. Coquillett); Lahaway, New Jersey (J. B. Smith).

Time of capture.—April.

Observations.—Mr. Coquillett described this small dark brown gnat as *Culex melanurus* from specimens taken in New Hampshire. The larva was first figured by Dr. Dyar. Nothing seems to be known of the adult habits. The larvae occur in woodland springs and swampy bogs, and are noticeable very late in the season, specimens being taken by Mr. Brakeley in New Jersey up to November. Later he found that the larvae hibernate, seeking the mud when the water is frozen over; they are half grown during this hibernating period.

Pupation is much retarded. They are bottom feeders, and so have well-developed trachea in the anal gills.

The larva varies from 7–8½ mm. in length; of a delicate build, pale yellowish to bronze-grey in colour, head yellowish-brown, siphon dark brown, black apically; antennae long and slender, narrowed beyond the tuft, surface with long spines, lateral tuft large on apical third, apex with three very long bristle-like hairs, one short bristle and a very small articulating segment; labial plate broad, seven to nine teeth on each side of apex, some pointing towards the middle; lateral combs of the eighth segment seventeen to twenty in number, arranged in a single row, greatly elongated in form; the spines on siphon eleven to fifteen in each row, long, thin, acuminate, either simple or with one lateral spine near the base; anal gills small, but nearly as long as the ninth segment.

Dr. Dyar states that the larva is slow in development and remains long at the bottom of the water, and that it inhabits permanent spring or deep rock pools.

The thin black eggs are laid singly on the surface of the

water, and breeding is probably continuous and the adult hibernates.

The male described here is one of a series sent me by Professor J. B. Smith.

A comparison of the photograph of the wing scales and those

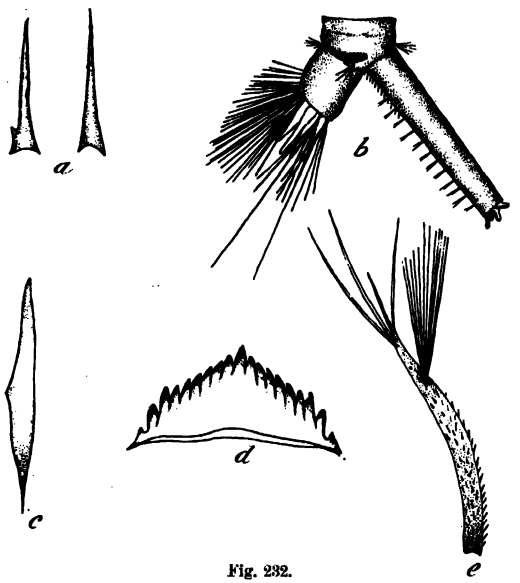


Fig. 232.

Culex melanurus. Coquillett.

a, Scales from siphon comb; b, siphon and anal segment; c, scale of comb on 8th segment; d, labial plate; e, antenna.

of a typical *Culex* show at once that Mr. Coquillett was wrong in placing it in that genus, and that it should be referred to the genus ***Melanoconion.***

The species is distinct and is very large for a ***Melanoconion.*** It approaches none seen or described at present.

No ♀ has been received.

MELANOCONION ANNULIPES. n. sp.

Head deep brown with grey scales; thorax deep rich brown, paler in the middle; abdomen deep brown with basal white lateral spots. Legs deep brown with the tarsals with apical and basal pale banding, the last hind tarsal pale ventrally.

♀. Head deep brown with long thin narrow-curved grey scales and some dusky ones, the palest around the border of the

eyes, numerous dark upright forked scales with deep violet reflections and dull pale grey scales at the sides of the head; clypeus deep brown; proboscis deep brown unbanded; palpi deep brown with long black chaetae, the apical segment long; antennae deep brown, basal segment large, rather paler, with almost testaceous hue on one side.

Thorax black, clothed with scattered narrow-curved bronzy scales and black chaetae, with a few almost golden ones on each side of the scutellum; scutellum paler, with narrow-curved bronzy and some dull golden ones, the mid lobe with six black chaetae; scutellum deep brown; pleurae deep brown with grey sheen (scales ?).

Abdomen deep brown, unbanded, with basal lateral white spots and pale golden border-bristles.

Legs deep brown, the hind legs with dull pale apical and basal bands, the last segment pale beneath, showing in a marked manner, the pale banding not so distinct in the fore and mid legs; ungues small, equal and simple; a whitish knee spot present.

Wings with dense large scales especially on the apical areas of the veins, some thin lateral ones on the stems of the second, fourth, and on the branches of the fifth; first sub-marginal cell much longer but little narrower than the second posterior cell, its



Fig. 233.
Wing of female *Melanoconion annulipes.* (♀.) n. sp.

base nearer the base of the wing, its stem about one-fifth the length of the cell; stem of the second posterior cell slightly more than half the length of the cell; posterior cross-vein longer than the mid, about one and a half times its own length distant from it.

Length.—3 mm.

Habitat.—Red Hills, Jamaica, W.I. (Dr. Grabham).

Observations.—A very distinct species with banded legs. The last hind tarsal appears almost white in the specimen, but I think the pale scales are only on the ventral aspect. Described from one perfect ♀.

Genus **NEOMELANOCONION.** nov. gen.

Somewhat similar in general appearance to *Melanoconion*, but the wing-scales are longer and *taeniorhynchus*-like and the male genitalia have the claspers long and with lateral spines towards the apex as in *Culiciomyia*, Theobald, and there is also a distinct foliate plate on the lateral process of the basal lobe. From *Culiciomyia* it may be told by the absence of the flat scales spreading well on to the occiput and the shorter fork-cells of the wings. The male palpi are acuminate, with very scanty hair tufts, as long as the proboscis, the apical segment being nearly twice as long as the penultimate.

Several species probably come in this genus, which have been provisionally placed in either *Melanoconion* or *Culex*. The type of the genus is *N. rima*, Theobald.

Another species included here is *Melanoconion indecorabilis*, Theobald.

Neomelanoconion rima. Theobald (1901).
Melanoconion rima. Theobald (1903).
Culex rima. Theobald (1901).

Mono. Culicid. II., p. 327 (1901); III., p. 240 (1903).

Some males have been examined and preparations made; from these the following additional characters may be quoted: palpi as long as the proboscis, the last two segments both with



Fig. 234.
Wing of *Neomelanoconion rima.* (♀.) Theobald.

black hairs; the apical segment more than twice as long as the penultimate.

Basal lobes of genitalia well developed, narrowed apically, lateral process with three well marked broad chaetae, the mid

the largest and curved at the apex, the lowest one the smallest and straight; claspers about two-thirds the length of the basal



Fig. 235.
Male genitalia of *Neomelanoconion rima*. Theobald.

lobe, curved and somewhat contorted apically with a series of backwardly projecting spines on their outer edge.

The specimens were taken in October and November by Dr. Strachan at Lagos, and some reached up to 3·5 mm. in length.

Genus **OCULEOMYIA.** nov. gen.

Head clothed with narrow-curved scales and upright forked ones, flat lateral ones. *Eyes very large and completely united in the middle line.* Palpi short and thick in the ♀. Thorax with narrow-curved scales, also the scutellum. Wings with dense almost *Taeniorhynchus*-like scales, but tapering to a fine point basally.

A very marked genus, at once identified by the large fused eyes and the peculiar wing scales.

Oculeomyia sarawaki. n. sp.

Head brown with pale scales. Eyes very large and united, silvery with a black patch on each side; proboscis deep brown, with a median pale band; palpi deep brown. Thorax rich brown, ornamented with some paler scales.

Abdomen deep violet brown, with basal golden yellow bands, yellow basal lateral spots, and apical lateral more dorsal spots of yellow, which become larger towards the end of the abdomen, and on the last two segments unite to form broad yellow apical bands.

Legs brown, with coppery and yellowish reflections and basal and apical pale bands, last segment of hind legs pale yellowish. Wings tinged with yellowish brown and dense brown scales.

♀. Head small, brown, with small narrow-curved pale creamy scales, bright brown upright forked scales in the middle, black at the sides, and flat creamy ones laterally. Eyes very large, meeting and apparently fused in the middle, silvery with a black patch on each side at head border; proboscis brown with a broad golden yellow band in the middle, with short hairs all

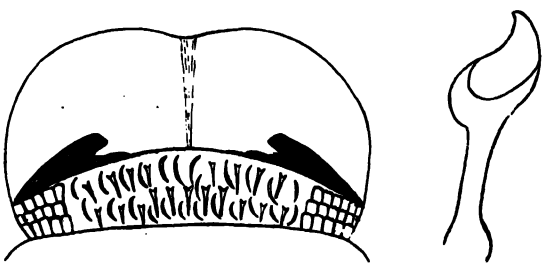


Fig. 236.
Head and haltere of *Oculeomyia sarawaki*. ♀. n. sp.

along its length, dark on the dark areas, yellow on the pale; palpi short, uniformly thick with black scales, except at the apex, where they are dull, creamy, and very bristly; antennae brown, basal segment testaceous on the outer side, dark on the inner, with a row of semi-transparent outstanding flat scales on the summit of the inner border.

Thorax deep shiny black, with narrow-curved bronzy brown scales and some patches of creamy ones, dense brown chaetae over the roots of the wings; scutellum brown, with dark and pale narrow-curved scales (?) and numerous brown border-bristles; metanotum brown and deep brown; pleurae brown and grey.

Abdomen brown, clothed with deep violet scales, the segments with basal yellow bands, basal lateral yellow spots; the second has a trace of apical dorsal yellow spots, the third to the sixth each have them, more prominent in the sixth, they nearly meet to form an apical band, the seventh and eighth have distinct

apical bands; the basal segment is testaceous, with brown hairs and a few dusky scales in the middle; border-bristles pale golden; venter with basal yellow bands and apical dark ones.

Legs brown, femora and tibiae mottled with yellow scales, apex of femora with golden yellow scales; the tarsal segments with apical and basal yellow bands, last tarsal on all the legs yellowish owing to scanty scales, most so on hind legs; femora and tibiae bristly; ungues equal and simple.

Halteres with pale stem and large fuscous hooked knob.

Wings with the membrane tinged in places with yellow, especially along the costa, many of the brown scales *taeniorhynchus*-shaped, especially on the branches of the second vein; first sub-marginal cell longer and narrower than the second



Fig. 237.
Wing of *Oculeomyia sarawaki.* (♀.) n. sp.

posterior cell, their bases nearly level; the stem of the first sub-marginal cell half the length of the cell; stem of the second posterior about two-thirds the length of the cell; posterior cross-vein longer than the mid, about one-and-a-half times its own length from it.

Length.—5 mm.

Habitat.—Sarawak (Dr. Barker).

Observations.—Described from a single perfect female. The markedly developed eyes of silvery hue, with prominent black spot on each one very characteristic, also the abdominal adornment. The general colour shows as a yellowish tint.

Genus **RACHIONOTOMYIA.** Theobald.

Journ. Bomb. Nat. Hist. Soc., Vol. XVI., p. 248 (1904).

Head clothed with flat scales only; palpi moderate sized in ♀ slightly clavate; proboscis long, as long as the whole body; antennae of ♀ densely pilose, hairs rather long. Thorax clothed with spindle-shaped scales; *scutellum drawn out into a large, thick, backwardly projecting spine,* hiding to a large extent the metanotum, on the basal area of the scutellum flat scales, which also occur on the base of the wings, the spine with scales also, some flat, some on ventral surface forked. Abdomen normal, but the scales large and rather loosely applied, giving a faint ragged appearance. Wings with rather short fork-cells, median scales on the branches of the second long vein thick and dense, also on first long vein, lateral vein-scales scanty, linear but broader than in *Culex;* upper costal border spiny. Legs normal. Male unknown.

This genus is very marked, owing to the strange scutellar process. It is the only genus in which I have seen any marked structural peculiarity in the scutellum, all other genera having the scutellum simple (*Anophelinae*) or trilobed (*Culicinae*, etc.).

Rachionotomyia ceylonensis. Theobald (1904).

Journ. Bomb. Nat. Hist. Soc., Vol. XVI., p. 248 (1904).

Head brown, with dull violet reflections and a grey border around the eyes; palpi, proboscis and antennae dark brown; proboscis as long as the body. Thorax brown to testaceous brown, pleurae bright clear brown with some silvery white scales; scutellar spine brown. Abdomen deep brown above, ochreous below, neither banded nor spotted. Legs deep brown, pale testaceous at their bases. Wings with brown scales.

♀. Head clothed with large flat scales, brown in some lights, dull violet in others, around the eyes a border of dull white or grey scales; two black bristles project forwards between the eyes, and traces of others at the sides; proboscis deep brown, as long as the whole body, curved upwards; palpi deep brown; small, but prominent, clavate; antennae deep brown with grey pubescence and black verticillate hairs; the globular basal segment with a grey sheen.

Thorax varying from deep brown to bright testaceous brown,

covered with irregularly placed rather flat spindle-shaped scales of a brown or bronzy hue, in front and on the prothoracic lobes small rounded flat grey scales, over the roots of the wings some larger flat scales, pale brown, grey or dull creamy coloured, those at the sides also larger and flatter; a few short brown curved bristles in front of the base of the wing, and a row of long ones over the base curved backwards; scutellum deep brown, sending out a large, thick, tapering, blunt process backwards, covered with flat scales of dull grey hues, the scales on the process smaller than on the base, the process has also small thin forked scales below, and is pale apically; metanotum chestnut brown; pleurae bright brown with flat white scales. Abdomen covered with large flat brown scales above showing dull violet reflections; ventrally dull ochreous, apparently no border-bristles, and the large scales rather loosely applied to the surface; apex with a few bristles and some small fine black scales.

Legs rather long and thin, deep brown with dull violet and bronzy reflections in some lights, coxae bright brown with some white scales; femora with dull white scales beneath.

Wings with the fork-cells small, the front sub-marginal longer and narrower than the second posterior, its base about level with the base of the second posterior cell, its stem very nearly as long as the cell, stem of the second posterior also nearly as long as the cell; posterior cross-vein a little more than its own length distant from the mid, the mid and supernumerary meeting at an angle; scales on the branches of the second long vein and on the apex of the first rather broad, flat and dense, on the remainder of the first rather spinose, on the other veins the lateral scales are linear but thicker than in *Culex*, median vein-scales single; upper costal border spinose.

Halteres with small yellow scales on the stem, dusky on the knob.

Length.—4 mm.

Habitat.—Peradeniya, Ceylon (E. E. Green).

Time of capture.—October, 1901.

Observations.—Described from a single perfect specimen, except for the ungues. It is a very obscure-looking insect except for the strange scutellar process.

Genus **FINLAYA.** Theobald.

Mono. Culicid. III., p. 281 (1903), Theobald; Gen. Ins. Fam. Culicid., p. 32 (1905), Theobald; Ann. Mus. Nat. Hung., p. 109 (1905), Theobald.

This and the next genus, *Orthopodomyia*, Theob., do not come in the *Aedinae*, but form a connecting link between the *Culicinae* and *Aedinae*. The palpi in the ♀ are small and rather long, and in the ♂ they are long, but never as long as the proboscis.

The marked wing scales and abdominal tufts at once separate this genus.

Finlaya poicilia. Theobald (1903).

Mono. Culicid. III., p. 283 (1903); Ann. Mus. Nat. Hung. III. p. 109 (1905), Theobald.

Additional localities.—Philippine Islands (Miss Ludlow). "Bred from larvae taken from banana trees." Also from



Fig. 238.
Wing of *Finlaya poicilia*. ♀. Theobald.

Friedrich-Wilhelmshafen; Seleo Berlinhafen; Mount Hausemann, Astrolabe Bay in New Guinea (Biró); and at Johnstons River, N. Queensland (Dr. Bancroft).

Notes.—The New Guinea specimens differ from those from Malaya in the following: (i) leg markings often yellowish instead of white; (ii) the wings present the following ornamentation: the costal pale areas may be either reduced to two, one small apical one, or four; the third long vein with two or three pale spots, the sixth with only two.

A fresh figure is given of the wing. The scales were figured of too pyriform a shape in Vol. III.

Genus **BANCROFTIA.** Lutz.

Mosquitos do Brasil, pp. 40–59 (1904).

Head clothed with small flat scales, except for a line of small narrow-curved median ones, spreading out basally and narrow curved ones around the eyes.

Palpi of ♀ nearly one-third the length of the proboscis, thin.

Thorax mostly nude, with minute narrow-curved and larger narrow-curved scales, *the latter becoming long and thin, and forming two prominent tufts projecting from the scutellum.*

Wings with dense rather large linear lateral vein scales, which become larger towards the base of the veins, and more spatulate on the sixth vein, median vein scales present, not closely appressed to the vein. Scales at the base of the first long vein short and broad. This very distinct genus, founded by Lutz, can at once be told by the cephalic and scutellar squamose structure.

A single species so far only is known.

Bancroftia albicosta. Lutz (1904).

Mosquitos do Brasil, p. 40 (1904).

Head black with a narrow white border around the eyes. Thorax bright brown, with a narrow white line around its border and two on the middle nearly parallel, widely separate. Abdomen deep brown, unbanded with basal lateral white spots and pale venter. Legs deep brown with basal and apical white bands, most pronounced on the hind legs. Wings brown scaled, the base of the first long vein forming a prominent white line.

♀. Head deep brown with a median line of golden narrow-curved scales spreading out at the back of the head, small flat dusky scales over most of the area, a thin line of narrow-curved snowy white ones around the eyes and small flat white ones at the sides; upright forked scales black. Palpi long and thin, black with white apex; proboscis black with two white spots one towards the apex; antennae deep brown, the internodes with numerous dark hairs; clypeus brown, elongated oval with a keel down the middle.

Thorax bright brown, with a median broad line of minute golden curved scales, a narrower one on each side, the intervening spaces bare, then a thin line of narrow-curved silvery white scales,

not reaching quite the front of the mesonotum and slightly diverging posteriorly, and the scales becoming long and hair-like before the scutellum and passing as two lines on to it, and projecting from it as two long tufts; on each side of the mesonotum a similar thin white curved line ending at the scutellum; metanotum deep brown, showing two median parallel pale lines; pleurae brown with two thin silvery parallel longitudinal lines, running roughly parallel with the lateral thoracic one.

Abdomen deep brown, unbanded, the second segment with a basal white patch and some white scales on the apex of the last segment, laterally are basal white patches; venter pale scaled.

Legs black, femora and tibiae mottled with white scales, traces of pale bands in fore legs on the first three tarsal segments, in the mid legs a white spot involving both sides of the tibio-tarsal and other joints, almost amounting to bands, in the hind legs the white banding is much more pronounced and the femora are mostly white; the femora have also a white ventral line; ungues equal and simple.

Wings with long dense lateral brown vein scales, much wider than in *Culex* and especially broad on the sixth vein, the first long vein densely white scaled from its base up to the termination of the second long vein; the first sub-marginal cell much longer



Fig. 239.
Wing of *Bancroftia albicosta*. (♀.) Lutz

and narrower than the second posterior, its base nearer the base of the wing and its stem about one-third the length of the cell; the stem of the second posterior about two-thirds the length of the cell; posterior cross-vein about two and a half times its own length distant from the mid,

Length.—4·5 to 5·3 mm.

Habitat.—Cantoveira, São Paulo, Brazil.

Time of capture.—April. (Dr. Lutz.)

Observations.— Redescribed from three females sent by Dr. Lutz.

It is a very beautiful species at once told by the thoracic lines of silvery white and the dense long silvery tufts of hair-like scales projecting from the scutellum.

Genus **PNEUMACULEX.** Dyar (nom. nud.).

Proc. Ent. Soc. Wash. VII., No. 1, pp. 45 and 46 (1905).

Head with broad short curved scales, and much expanded upright scales only, those at the sides of the head broader and flatter than elsewhere, but not spatulate and appressed as in other *Culicine* genera. Palpi short in ♀ ; long in ♂, thin, no hair-tuft, last segment very small, penultimate moderate, antepenultimate long. Male antennae plumose.

Thorax with very scanty narrow-curved scales and lines of more prominent rather flatter and broader ones.

Scutellum with the broader-scaled lines continued on to it, otherwise nude ; two posterior border-bristles.

Abdomen with broad spatulate scales.

Wings with dense scales, many inflated.

This genus closely resembles Dr. Lutz's *Bancroftia* in general appearance, but is easily separated by the peculiar cephalic squamose structure, the wing scales and the presence of scales all over the mesonotum.

The generic characters given by Dr. Dyar are of no value, as such, being larval characters and the only adult ones being male genitalia, so no one could place a female, nor for the matter of that a male either unless dissected.

The male sexual characters given are as follows:—"Side pieces conic, without apical lobe ; basal lobe small but bearing two stout setae ; terminal clasp slender, enlarged a little outwardly with a multiple articulated tip. Harpes short, chitinous, concave, with trifid apex ; harpogones small, slender, chitinous, acute ; another pair of appendages more basally placed, shorter than the harpogones, with a terminal hook ; a median, divided, double tipped membrane (unci ?)."

The larva has besides a peculiar dorsal plate, an enlargement of the tracheal tubes into a sort of bladder in the thorax, suggesting *Corethra.*

PNEUMACULEX SIGNIFER. Coquillett (1896).

Culex signifer. Coquillett.

Stegomyia signifer. Coquillet.

Canad. Ento. XXVIII., p. 43 (1896); Mono. Culicid. I., p. 322 (1901), Theobald; Bull. 4, N. Se. U.S. Dep. Agri. Div. Ent., p. 23 (1896), Howard; Bull. 25, N. Se., p. 31, U.S. Dep. Agri. Div. Ent. (1900), Howard; Les Moust., p. 258 (1905), Blanchard; Class. Mosq., N. and M. Ameri. Tech. Se. II., p. 26, U.S. Dept. Agri. (1906), Coquillett.

Head deep blackish-brown, with snow white scales and black upright ones. Proboscis unbanded. Thorax deep rich brown, with two median white lines, two behind converging posteriorly and one curved one on each side, the four latter spreading on to the scutellum.

Abdomen brown, with basal white bands, white scaled at the base. Wings with mottled brown and white scales. Legs deep brown, with some speckled white scales on femora and tibiae, and with apical and basal white banding, last hind tarsal all white.

♂. Head black, with scattered broad, short curved snow-white scales, densest around the eyes and becoming broader and flatter at the sides, numerous long black upright forked scales, broadened apically and with fimbriated edges; chaetae black. Proboscis broad black and densely scaly, with a few scattered white scales. Palpi as long as the proboscis, thin, black, with small white apical segment and a narrow white band at the base of the longer penultimate segment; no hair-tufts, a few short bristles at the apex of the penultimate and small terminal segments.

Thorax blackish-brown, with very scanty paler obscure brown narrow-curved scales and narrow snow-white lines of rather larger scales, a single row only, as follows :— two median anterior nearly parallel ones, two sub-median ones commencing just before the median ones end and converging towards the scutellum and extending on to it, and a curved one at the edge of the mesonotum; scutellum deep brown, the sub-median and lateral single scaled white lines extending on to it, mid lobe with two posterior border-bristles only; metanotum paler brown, with three thin darker lines; pleurae brown, with some flat white scales.

Abdomen deep brown, with basal pale creamy-white bands, the two basal segments mostly creamy scaled; the basal creamy

bands spread out laterally; posterior border-bristles bright golden-brown, with shorter intermediate paler ones.

Legs with femora and tibiae deep brown, with scattered white scales, the base and under side of femora mostly white; apex of tibiae white; fore-legs unbanded; mid legs with a narrow pale band at the tibio-tarsal and two following tarsal joints; in the hind legs the banding is broader and extends to all the segments,

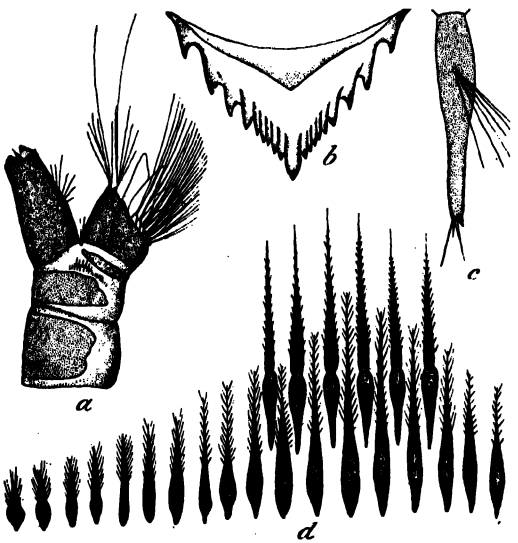


Fig. 240.

Pneumaculex signifer. Coquillett.
a, Siphon and anal segments; b, labial plate; c, antenna; d, scale area of 8th segment. (After Smith.)

but the last, which is all white; ungues of fore-legs unequal, uniserrate; mid unequal simple; hind equal and simple.

Wings with large brown and white scales. First sub-marginal cell much longer and narrower than the second posterior cell, its base about level with the latter, its stem about one-third the length of the cell; stem of the second posterior rather more than one-half the length of the cell; posterior cross-vein longer than the mid, about its own length distant from it. Halteres with pale stem and knob.

Genitalia with stout basal lobe, tapering gradually to a narrowly rounded apex; clasper rather stout, slightly expanded at the base, with a stout terminal spine, and four to five more

slender ventral teeth. Claspette a rather conspicuous basal lobe, bearing several long stout spines. "Harpes small, somewhat inflated near the middle, and tapering to three stout spines. Harpogones divided, composed of two stout, recurved, chitinous processes, the posterior limb larger than the anterior (E. P. Felt)."

Length.—5 to 5·5 mm.

♀. Similar to the male in thoracic and abdominal adornment.

Ungues equal and simple on all the legs. Palpi a little more than one-third the length of the proboscis, composed of three segments, two basal ones, long and slender apical one very small, clothed with black scales and a few white ones, apex white. Antennae black, with a few white scales.

Length.—5 to 5·5 mm.

Habitat.—Delair. Camden County; Chester, Morris County; Lahaway, Ocean County, New Jersey (Prof. J. B. Smith); Benecia, California (Miss Ludlow); Mississippi State (Professor Glenn-Herrick).

Observations.—Originally described by Coquillett as a *Culex*. It is redescribed here from specimens sent me by Miss Ludlow. It has been placed in the genus founded by Dr. Dyar, but it is merely a bare name as no generic characters are given of any value, the name has been adopted to save confusion in synonomy.

Nothing is known of the habits of the adult.

Description of the larva.—The larva has been described by Professor J. B. Smith.

It reaches 7–8 mm. in length; greyish-black in colour, thorax lighter; head purplish-black, as long as broad. Six equally placed hair-tufts of five or six hairs each are in a transverse row on the anterior part of the vertex. Antennae short, dilated at the basal third, tapering towards the tip, apex with two long spines, two smaller ones and a small peg. Surface nude, hair-tufts on the shaft a little over one-fourth from the base, composed of six feathered hairs.

Labial plate equilateral, with a large apical tooth, then five or six small lateral ones, blunt at the tips, and four very large pointed ones below, usually nine teeth on each side of the apex, but now and then ten.

Lateral combs consist of two rows of scales; the first with from fifteen to twenty-one greatly elongated ones, fringed laterally at the basal half with fine hair, the longest scales towards the base; the second with six or seven scales, their apices extending between those of the anterior row. The individual scales of the

row are much longer than any of those of the first and are constricted about one-third from the base; sides fringed as in the others. Siphon three times as long as wide, dark, evenly tapered towards the apex, no lateral row of spines, but has a hair-tuft about the middle. Ninth segment small. Anal gills short.

Habits.—Found in a tree-hollow in September by Harold Marsh in company with *triseriatus* and again in October. Several broods are indicated. Others have been found in tubs of foul water (Seal).

Genus **ORTHOPODOMYIA.** Theobald.

The Entomologist, Vol. XXXVII., p. 236 (1904).

Head clothed with narrow-curved and forked upright scales; flat one at the sides. Palpi of five segments in the female; long, as long as half the proboscis; in the male of four segments, three-fourths the length of the proboscis. Thorax with narrow-curved scales on the prothoracic lobes, mesothorax and scutellum. Wings spotted.

Allied to the genus *Finlaya*, Theobald, but differs in the squamose structure of the head and scutellum. The female palpi are noticeably very long. The hind legs, when the insect is resting, are held straight out, close together, and quite close to the surface upon which the fly rests, an abnormal attitude in the *Culicinae*.

Orthopodomyia albipes. Leicester (1904).

The Entomologist, Vol. XXXVII., p. 237 (1904).

A medium-sized species much speckled with yellow and grey, and with the last three hind tarsals with conspicuous creamy yellow, others with narrow, basal bands. Wings with four prominent white costal spots and three small ones at the base. Proboscis with two white bands. Palpi of female more than half as long as the proboscis.

"♀. Head broad transversely, set close to the thorax, dark grey, in a poor light almost black, densely clad with white narrow-curved scales and upright forked scales which are white in front and dark brown behind; the fork-scales are very numerous, broad topped, the free forked edge with numerous serrations; there is a small patch of broad, flat, white scales, laterally on either side, very difficult to see; there are two

vertical bristles, dark brown in colour, projecting forwards, and three or four post orbitals.

Antennae with the basal segment brown, the inner and upper faces rather densely clad with creamy spindle-shaped scales; the second segment is a dirty white at either end and black in the middle; the verticillate hairs are inserted about the middle, and are very short except on the inner face; there is a tuft of long creamy yellow scales on the inner face; other hairs are inserted near the base, and there is a whorl of short stiff bristles at the end of the segment; the succeeding segments are black at the apices and at the insertion of the verticillate hairs, and dirty white between their immediate bases; at the apex of each segment except the last there is a whorl of short stiff hairs.

Clypeus naked, dark brown.

Palpi of five segments; first segment short, swollen and constricted in the middle; second segment longer, linear; third about as long as the first two, rather swollen at the apex; fourth segment about one-third the length of the third; fifth minute but quite distinct. The whole palp is about two-thirds the length of the proboscis; it is black scaled except for some white scales on the upper surface of the first segment, a ring of white scales at the apex of the second, third and fourth segments, and white scales over the whole of the fifth segment. Proboscis long, black scaled over the first half, then there is a band of creamy scales extending about twice as far on the under surface as it does above; beyond this above are black scales and white and black again at the immediate apex; labellae creamy yellow.

Prothoracic lobes black, not prominent, covered with white narrow-curved scales above and with broader, almost spindle-shaped white ones below.

Metanotum dark grey, almost black, covered with narrow-curved scales, black, tawny and white in colour, arranged in a sort of pattern. The anterior margin is covered with white scales, followed laterally by tawny scales; dorsally in the centre is a line of white scales running about half-way across the metanotum and ending opposite a diamond-shaped patch of tawny scales edged with a few black scales set in a bare space which appears as a black margin; flanking the median line of white scales on either side is a line of tawny scales, and outside this line is a patch of white scales anteriorly and a bare space having the appearance of a black spot owing to the dark colour of the metanotum; the posterior part of the thorax is chiefly occupied

with a diamond-shaped patch of tawny scales edged with a few black scales and a bare space; outside this are white and tawny scales arranged somewhat irregularly. The arrangement of the scales varies considerably.

Scutellum dingy yellow, clouded with black; all three lobes clad with rather long white narrow-curved scales. Scutellar bristles brown.

Wings clothed with black and white, broad spatulate in some specimens, almost spindle-shaped scales in others. Costa black scaled with white spots; the first spot close to the base and involving the base of all the long veins; the second involves the costal, sub-costal and first long vein; the third involves the veins as far as the fourth long vein. The fourth passes on to the base of the first fork-cell and the fifth spot is very narrow and involves the lower branch of first fork-cell; there is a spot on the wing field at the base of the second long vein and another on the upper branch of the fifth vein near its base, and one at its apex and another spot at the base of the second fork-cell. Supernumerary and mid cross-veins form an obtuse angle towards the base. Posterior cross-vein distant about four times its length from the mid cross-veins. Pleurae dark brown, thickly covered with broad flat white scales.

Legs with the fore coxae pale, with creamy scales in the front legs and hind and mid dark brown, with a few white scales; femora clad with purple scales freely mottled with golden; on the fore legs is a ring of golden scales a little before the apex which does not include the upper face; on the mid and hind legs the scales at the apices of the femora are elongated, and give an ill-marked feathered appearance to the legs; the tibiae are mottled purple and golden, and at the apices of all the tibiae is a band of creamy yellow scales; the base of the first tarsal and next two tarsal segments on the fore and mid legs are banded with creamy scales; in the hind legs the base of the first tarsal and second tarsal segment are banded, and the last three segments are creamy white. Ungues equal and simple on all the legs.

Abdomen covered with purple brown scales; each segment bears on the dorsum two spots of white scales placed on either side of the middle line and rather nearer the apex than the base; laterally there is a basal patch of white, apically a band of white scales; ventrally each segment is basally banded, and some of the segments have a median white spot.

Length.—5 mm.

♂. Head brown; the narrow-curved scales form a dense tuft between the eyes and a more definite margin to them than in the female. There are more white upright forked scales, the brown comprising about three or four rows on the nape. Antennae with the basal segment dark brown, sparsely clad with small flat white scales; succeeding segments white, with black bands at the insertion of the verticillate hairs; the last two segments much elongated; first five segments with numerous silky linear white scales with blunt rounded ends; verticillate hairs pale ochre-yellow. Palpi four segments, about three-fourths the length of the proboscis; there are a few white scales on the upper surface immediately in front of the clypeus, a ring of white scales at the middle of the second segment, another ring at the apex of third segment and the fourth segment is completely white scaled; the rest scaled with dark brown scales; the first segment is very short, second is very long and in the middle shows a false joint, the third is about one-third the length of the second and the fourth segment is short and always carried bent down towards the proboscis. Proboscis scaled dark brown for about half its length, then there is an incomplete ring of creamy yellow scales, followed by a band of dark brown scales, the apical fourth is swollen and scaled with creamy yellow scales.

Thorax as in the female.

Wings with an additional costal spot of white scales between the basal and second spots.

Legs with more pale scales on the tibiae; the banding of fore and mid legs is rather more evident, fore and mid ungues unequal, larger uniserrated.

Abdomen with a distinct basal white band to the hinder segment in addition to the dorsal white spots.

Length.—5·3 mm.

Habitat.—Kuala Lumpur.

Time of capture.—April" (Leicester).

Observations.—Described by Dr. Leicester from specimens bred from larvae taken in bamboo jungle.

It is a very distinct species told at once by the last three hind tarsals being white.

It resembles the *Finlayas* and can only be separated from them by scale examination.

Sub-Family **HEPTAPHLEBOMYINAE.**
Theobald.

Genus **HEPTAPHLEBOMYIA.** Theobald.

Mono. Culicid. III., p. 336 (1903); Entomologist, Vol. XXXIX., p. 156 (1905); Gen. Ins. Fam. Culicid., p. 41 (1905), Theobald.

This genus was described in Volume III. of this work from a single female. Since which time much fresh material has been received, and we now have at least four well-marked species, three described by Ventrillon from Madagascar and one by myself.

So far the genus is only known in Africa and Madagascar.

M. Ventrillon's species and remarks are of particular interest, and his descriptions which are here reproduced are drawn up most accurately.

The strangeness of the venation might be thought sufficient to exclude them from the *Culicidae* altogether, but I prefer at present to leave them as an aberrant group in the family.

Characters of the genus.

Head clothed with narrow-curved scales and upright forked-scales, except at the sides where they are small and spatulate.

Palpi of the female small but prominent, in the male long, acuminate, the last two segments hairy.

Thorax clothed with narrow-curved scales and also the scutellum and prothoracic lobes; pleurae in the female with patches of flat scales, which end in a sharp point, in the male rounded apically.

Wings with a distinct seventh-scaled long vein, which is not as a rule scaled for its whole length.

Scales of the wing broader than in *Culex*, especially at the apices of the veins, including the branches of the fork-cells.

Heptaphlebomyia simplex. Theobald (1903).

Mono. Culicid. III., p. 337 (1903); The Entomologist, Vol. XXXIX., p. 157 (1905).

Head deep brown, with greyish scales; palpi of ♀ thin, black and white scaled, of the male thin, black; proboscis black, unbanded.

Thorax deep brown, with small reddish golden narrow-curved scales, brown pleurae with snowy white puncta.

Abdomen deep brown, with basal white curved bands and basal white lateral spots.

Legs deep brown, unbanded; white femoral and tibial apical spots, and traces of a very fine indistinct white line on femora and tibiae.

♀. Head deep brown, with narrow-curved grey scales, somewhat largest in the middle of the head, and black upright forked scales; small flat white lateral scales and a row of rather long and prominent deep brown bristles projecting from the front of the head, those of each side pointing inwards; clypeus and proboscis deep black; palpi thin, rather irregular in form and clothed with black and white scales.

Thorax deep brown, clothed with narrow-curved reddish golden scales, some grey ones in front near the head, another small patch in front of the roots of the wings, pale ones over the roots and before the scutellum; scutellum with pale dull creamy curved scales, with two series of border-bristles, the larger deep brown, the smaller pale golden; prothoracic lobes with narrow-curved pale scales and some brown chaetae; pleurae deep brown, with patches of flat pointed white scales and short golden bristles here and there.

Abdomen deep orange-yellow, clothed with deep blackish brown scales with violet reflections and with basal white curved bands, those of the second, third, and fourth segments being in the form of almost median curved spots; all the segments with basal white lateral spots; border-bristles small and pallid, and many pale hairs at the sides of the body.

Legs deep black, apices of femora and tibiae with a white



Fig. 241.
Wing of *Heptaphlebomyia simplex*. ♀. Theobald.

spot, and on both a rather indistinct white line beneath; ungues small, equal and simple.

Wings with the first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem varying from one-third to one-half the length of the cell; stem of the second posterior about two-thirds the length of the cell; posterior cross-vein one and a half to twice its own length distant from the mid; scales on the seventh vein vary from 10 to 15.

Length.—3·5 to 4 mm.

The male described here was sent with the female but may not belong to that species.

♂. Head clothed with narrow-curved pale scales, a more or less prominent median bare line; clypeus and proboscis deep brown; antennae grey, with deep brown bands and verticillate hairs.

Palpi deep brown, the apical segment acuminate, last two segments hairy, the antepenultimate thin and weak with a trace of a pale band upon it, hairs black; two apical segments equal.

Thorax very similar to the female, but does not show pale scales.

Abdomen banded as in the female, narrow, with rather scanty long pale brown hairs; the apical segment with scattered creamy scales, the penultimate with a pale basal band extending down each side of the segment. Fore and mid ungues unequal, both uniserrated, hind equal, simple and small.

Wings with the seventh vein apparently not scaled. First sub-marginal cell considerably longer and narrower than the second posterior cell, its base nearer the base of the wing than that of the second posterior cell, its stem about half the length



Fig. 242.
Wing of *Heptaphlebomyia simplex*. ♂. Theobald.

of the cell; stem of the second posterior cell not as long as the cell; posterior cross-vein nearly twice its own length distant from the mid; sixth vein curved almost at right angles at the apex.

Male genitalia with rather narrow basal lobes, with a long

curved lateral process composed of several narrow laminae, and nearer the clasper another process, shorter, and composed of five parts; the clasper terminates in a small jointed process.

Length.—3·5 to 4 mm.

Habitat.—Both ♀'s and ♂'s from Bihé, Angola, Portuguese West Africa (Dr. Creighton Wellman).

Observations.—This species shows much variation in size. I do not think the three ♂'s sent with the ♀'s can belong to this species.

The ♀'s might be mistaken for *C. fatigans*, Wiedemann, and for *C. creticus*, Theobald, but can at once be told by the seventh scaled vein.

HEPTAPHLEBOMYIA ARGENTEOPUNCTATA. Ventrillon (1905).

Archiv. d. Parasitologie I., IX., no. 4, p. 446 (1905).

"♂. *Head.*—The head is black. The occiput is covered with curved white scales and black forked scales. The eyes are bordered with curved white scales. Clypeus black. Antennae with white segments with long black hairs. Palpi of four segments, basal segment very short, the second very long, covered with black scales on the inferior surface; beneath there is a part denuded and white, also one part covered with black and white scales; apex covered with black scales. The other two segments are black, covered with black scales and long black hairs. The base of the third joint bears a little tuft of white scales. The proboscis is much shorter than the palpi. It is black with a very large dull white scaled band on the apical third.

Thorax.—The prothoracic lobes covered with fusciform white scales. Mesothorax black with small black scales with yellow reflections. On the superior part it shows: 1st, a small tuft of fusciform white scales on the front; 2nd, another small tuft of the same scales on each side, in the side still larger; 3rd, lastly, more posteriorly a white lateral area larger than the preceding. At the side is seen a little spot of white scales at the edge of the mesothorax, another on the neck and two others on the sides. The scutellum is yellow and the lobes are covered with fusciform white scales. Metanotum black and nude. The halteres have the stalk yellow, and the apical knob black, covered with dusky scales.

Abdomen.—The segments of a yellow hue, covered with flat black scales and bear some black hairs on their posterior borders,

a spot of white scales at their base. This spot is confined to the median area and may spread out so as to reach the sides of the segment; from thence it is converted into a long lateral spot as far as the last segment. The basal genital lobes are very short. They show beneath, towards the median region, five hairs and a large transparent plate spatulate in form. The clasper is larger at the base than at the apex and ends in two short teeth, one larger than the other.

Wings.—Not spotted. The first sub-marginal cell much longer and narrower than the second posterior cell; its base is nearer the base of the wing than the apex of the sub-costal; the stem is equal to half its length as is also the stem of the second posterior. The supernumerary cross-vein is nearer the base of the wing than the mid. Posterior cross-vein is distant from the mid twice its own length. This species has a false nerve covered with a row of scales which forms a seventh vein.

The *legs* are yellow with a slender line of white scales. In the anterior legs, the dorsal area of the femur is covered with yellow scales, and the apical part with black scales; the apex has a spot of white scales; the tibia is covered with yellow scales and some black ones on the dorsal area; apex with a spot of white scales; all the rest of the leg is covered with black scales with yellow reflections. The claws are equal, long and dentate. The mid legs resemble the anterior, and the two ungues unequal, one dentate; the femur of the posterior pair is covered with yellowish white scales on two-thirds of their length; the other third is covered with black scales, a small apical spot of white scales; tibia black, with a beautiful white band at the apex; remainder of the leg black; the ungues short, equal, not dentate.

Formula of ungues.—1·1–1·0–0·0.

Length.—6·5 mm. including proboscis.

♀. *Head.*—Resembles that of ♂. Segments of antennae yellowish. Palpi black. Proboscis black with a yellow band in the middle.

Thorax.—Laterally the thorax shows 9 to 10 little white spots. Abdomen, legs and wings like the ♂.

Formula of ungues.—0·0–0·0–0·0.

Length.—5·5 mm., including proboscis.

Habitat.—Tananarive and environs. It can be taken at all times of the year, but especially during the rainy season. It is a very rare species" (Ventrillon).

HEPTAPHLEBOMYIA MONFORTI. Ventrillon (1905).

Archiv. d. Parasitologie I., IX., no. 4, p. 448 (1905).

"♂. *Head.*—The head is grey; bearing in the middle yellow curved scales and black forked scales, and on the edge (sides) yellowish white scales. The eyes are edged with little white scales. Segments of antennae white with very long black hairs. There are some white scales on the basal segment.

Clypeus small, black and nude. Palpi with four segments covered with white scales; the base of the two terminal segments has a small tuft of white scales. The *proboscis* is black, not banded.

Thorax.—Prothoracic lobes bear a number of yellow hairs and some elongated yellow scales. The mesothorax is greyish-black and is covered with yellow curved scales. The scutellum is slightly yellow and possesses very numerous yellow scales on the three lobes. Metanotum greyish-black and nude. The pleurae have some patches of flat white scales. Halteres yellowish-white.

Abdomen.—The segments have a blackish yellow hue, and are covered with blackish scales. They have a band of flat whitish scales at their base and a number of yellow hairs on their borders; at the sides the segments have basal lateral white spots. Venter covered with flat white scales.

Wings.—The wings are unspotted. The scales black, narrow, except those of the sub-costal and first long vein which are large and flat. The apex of the sub-costal vein joins at the level of the base of the first sub-marginal cell. This cell is very much longer and a little narrower than the second posterior cell. The stem of the first cell a third of the length of the cell, the stem of the second posterior cell is also that length. The supernumerary cross-vein is nearer the base of the wing than the mid. The posterior is longer than the mid, and twice its length distant. This gnat has the seventh-scaled nervure. The fringes have two rows of scales at the base of the wing to the apex of the fifth long vein, and three rows from this point to the apex of the wing.

Legs.—Bases yellow and have some white scales. Femora of fore legs have flat white scales on the dorsal surface, and black on the ventral.* Apex slightly yellow. Tibia black and almost covered with white scales. The rest of the legs are black, but

* This is evidently an error, and means the base and apex.

covered with a number of dusky yellow scales. The mid and hind legs resemble the front, but the femora are almost entirely white.

Formula of ungues.—1·1–1·1–0·0.

Length.—6 mm.

♀. *Head.*—Resembles that of the ♂.

Antennae hairy. *Palpi* of four segments, bearing some flat white scales. On the apical segment all the scales are black and flat. *Proboscis* as in ♂. Thorax, abdomen, and legs as in the male. The wing fringes have three rows of scales.

Formula of ungues.—0·0–0·0–0·0.

Length.—4·5 mm.

Habitat.—At Ankajobe and at Arivonimamo, but it is especially abundant at Tananarive."

METANOTOPSILAE-MICROPALPAE.

Sub-Family **AEDINAE.** Theobald.*

The following genera occur in this sub-family: *Aedes*, Meigen; *Skusea*, Theobald; *Leptosomatomyia*, Theobald; *Haemagogus*, Williston; *Cacomyia*, Coquillett; *Gualteria*, Lutz; *Aedeomyia*, Theobald.

Genus **AEDES.** Meigen.

Dipt. Beschr. I., p. 13 (1818), Meigen; Suit. à Buff. I., p. 37 (1834), Macquart; Hist. d. Ins. II., p. 454 (1845), Blanchard; Dipt. Scand. (1850), Zetterstedt; Ins. Brit. Dipt. III., p. 242 (1851), Walker; Fauna Austr. II. (1864), Schiner; Bull. Soc. Ent. Ital., p. 297 (1896), Ficalbi; Mono. Culicid. II., p. 224 (1901), Theobald; and III., p. 205 (1903), Theobald; Gen. Ins. Fam. Culicid., p. 35 (1905), Theobald.

* Blanchard (Les Moust., p. 398, 1905) spells this *Aedeinae*.

AEDES FUSCUS. Osten Sacken (1877).

Bull. U.S. Geol. Surv. III., p. 191 (1877), Osten Sacken; Mono. Culicid. II., p. 226, pl. XXXII., fig. 126; III., p. 286 (1903), Theobald; Journ. N. Y. Ent. Soc. X., p. 197, pl. XVII., fig. 1 (1902), Dyar; Mosq. N. Jersey, p. 332 (1905), Smith.

Additional localities.—New York State (E. P. Felt); New Jersey (Mr. Grossbeck); New Haven and Southampton, Connecticut.

Observations.—A number of this species have been sent me, and from the ♂'s fresh preparations have been made; the ♂ palp

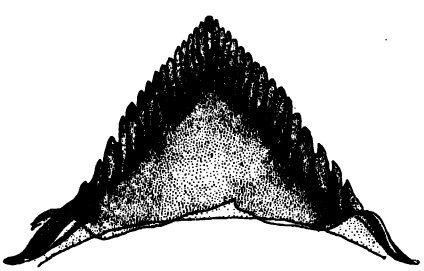


Fig. 243.
Labial plate of *Aedes fuscus*. Osten Sacken. (After Felt.)

has only three segments, the apical one very small and nipple-like; the appearance at times is that of a 5-jointed palp, but the basal constrictions are not complete. The fore and mid ungues are unequal, the larger with a prominent tooth, the hind equal and both uniserrate.

In both sexes the banding of the abdomen is apparently absent; I fancy this is due to shrinkage when dead.

Nothing has been learnt with regard to the habits of the adults. In Vol. III. of this work (p. 286) I said that the larvae had been found in New Jersey in the pitchers of Pitcher plants (*Sarracenia*) by Mr. Brakeley. This evidently referred to *Wyeomyia* (then called *Aedes*) *smithii*.

The larvae of *Aedes fuscus* occur in pools with *Culex aurifer*, etc. They are found in April and May in New Jersey (J. B. Smith), and the adults in May. It is assumed the eggs are laid in mud and winter as such, as larvae are found in pools in spring which have been dried up all the winter.

The *larva* measures 7 to 8 mm. in length, and resembles in general appearance that of *canadensis* and *sylvestris*; colour grey

to dark slate-grey, head yellow with dark spots, one crescent-shaped, and other small dots on vertex; antennae moderately long, slender, lateral tuft well below middle, composed of 5 to 6 hairs, small spines on surface, thickly set at base, apex with three long and one short spine and small joint; labial plate with 9 to 13 small teeth on each side of apex; lateral combs of eighth segment of twelve scales, each arranged in an irregular row, each scale elongate, with short, fine lateral hairs on the apical two-thirds; spines of siphon in two rows of 12 to 16 each, apical

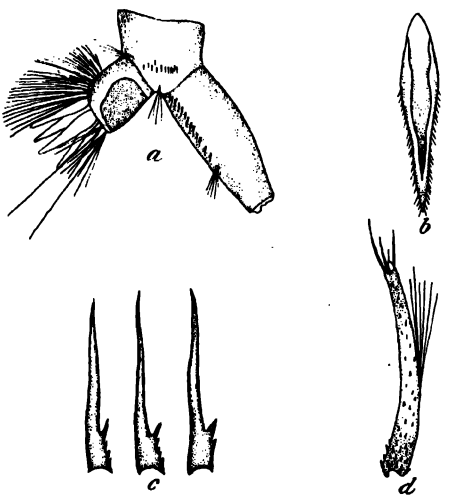


Fig. 244.

Aedes fuscus. Osten Sacken.
a, Siphon and anal segments; b, scale from comb of 8th segment; c, scales from pecten of siphon; d, antenna. (After Smith.)



Fig. 245.

Air tube of *Aedes fuscus.* (After Felt.)

two separated from the rest and one another, spines with one large tooth near base and one to four small ones below it; anal gills slender, longer than the ninth segment.

AEDES CINEREUS. Meigen (1818).

Aedes rufus. Gimmerthal (1845).*

Syst. Beschr. I., 13 (1818), Meigen; Mono. Culicid II., p. 232 (1901), Theobald, Állattan. Közl. III., p. 72 (1904), Kertész; Ann. Mus. Nat. Hung. III., p. 110 (1905), Theobald.

Fresh specimens have been examined from Hungary. A ♂ and ♀ carefully examined showed the hind ungues of the ♀ to

* Bull. Soc. Imp. d. nat. d. Moscou, xviii., p. 295.

be equal and simple, not uniserrate as figured by Kertész. The flat head scales in the Hungarian specimens are more creamy than those from Britain.

Mr. C. O. Waterhouse has recently taken the larvae in the New Forest.

AEDES NIGRESCENS. n. sp.

Head, thorax and abdomen dark brown, legs dark brown; a tuft of spines at the apex of the tibiae.

♀. Deep brown with dull narrow-curved pale scales and pale brown upright forked scales; palpi and proboscis deep brown, palpi short; antennae brown, the segments rather long.

Thorax deep brown, scantily clothed with paler brown narrow curved scales, paler ones on each side in front; with a few long deep brown chaetae; scutellum deep brown, with narrow-curved dull scales and four large median dark border-bristles; metanotum rich brown; pleurae deep brown.

Abdomen deep blackish-brown, unbanded, some of the lateral scales rather outstanding; basal segment with long dark hairs, those of the posterior borders of the segments short and pale brown.

Legs deep brown, unbanded, base and underside of femora pale; apex of tibiae with a small tuft of scales and bristles and to some extent the apices of other segments show slight tufting; ungues small, equal and simple.

Wings with the fork-cells short, the first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem about half the length of the cell; stem of the second posterior cell nearly as long as the



Fig. 246.
Wing of *Aedes nigrescens*. ♀. n. sp.

cell; posterior cross-vein much longer than the mid, nearly twice its own length distant from it; scales dense, especially on the branches of the first sub-marginal cell, the third vein with broader median scales and darker than rest of the wing.

Halteres with pale stem and fuscous knob.

Length.—2·5 to 3 mm.

♂. Palpi very short and thin with brown scales, but much longer than in the ♀; antennae with white internodes and brown verticels, brown plume-hairs. Thorax and abdomen as in the ♀. Ungues of the fore legs unequal, both uniserrate; of the mid unequal, much curved, simple; hind equal and simple.

Wings with short fork-cells, the first sub-marginal longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem equal to rather more than half the length of the cell; stem of the second posterior cell nearly as long as the mid; posterior cross-vein longer than the mid, about one and a



Fig. 247.
Male genitalia of *Aedes nigrescens*. n. sp.

half times its own length distant from it, scales of a more uniform shape than in the female; genitalia with rather small broad basal lobes, broadest basally; claspers broad, forked, one branch longer than the other, which is the apex of the clasp ending bluntly and with a small segment at right angles to it. The lateral process of basal lobe with a large leaf-like plate, curved and narrowed apically and two unequal-sized small plates and a bristle.

Length.—3 mm.

Habitat.—Castle Rock, India (Capt. James, I.M.S.).

Time of capture.—January, February, and March.

Observations.—A very small, obscure species looking like a *Melanoconion*, but the wing scales are longer and the very marked short ♂ palpi and genitalia at once preclude it. It is a true

Aedes. It is an extremely delicate species that evidently shrinks on drying to some considerable extent.

The ♂ genitalia are very marked, more so than in *Aedes fuscus*, but the peculiar forked nature of the clasper is evident in both.

Genus **SKUSEA**. Theobald.

Mono. Culicid. III., p. 291 (1903).

The male of this genus has short palpi, composed of three segments, the apical one small and nipple-like. The second segment of the antennae slightly swollen, plumose. Genitalia with short, thick, blunt claspers; basal lobes broad and short, a large median semi-circular process between them at the base and two sword-like harpes, curved at the base.

Thus this genus is definitely settled to be *Aedine*, as originally thought, and not near *Stegomyia*, as placed in 'Genera Insectorum.'

The species tabulate as follows:—

Abdomen with basal black median white and apical brown bands; ungues simple	*funerea*. Theobald.
Abdomen with median white fascia only; ungues of fore and mid legs uniserrate	*mediofasciata*. n. sp.
Abdomen with basal white bands	*culiciformis*. Theobald.
Abdomen with small nearly basal lateral white spots	*diurna*. Theobald.

Skusea funerea. Theobald (1903).

Mono. Culicid. III., p. 292, 1903.

Var. ornata. Theobald (1905).

Ann. Mus. Nat. Hung. III., p. 79 (1905).

Head black with a white median line, and a creamy patch on each side. Thorax bright rich reddish-brown ornamented as follows:—an irregular median golden scaled line, and a curved golden scaled line on each side meeting in front; pleurae brown with grey spots. Abdomen black with four white rather irregular bands towards the middle of the segments, *i.e.*, with three bands, two black and one white. Legs brown unbanded; femora pale below.

♀. Head black, clothed with small flat black scales, a

median line of creamy white and lateral areas of creamy-white ones, a narrow border of golden narrow-curved scales around the eyes; a few golden bristles project between the eyes; palpi and proboscis brown; antennae brown, basal segment pale bright testaceous.

Thorax deep brown clothed with small narrow-curved rich reddish-brown scales, ornamented with a more or less distinct median line of narrow-curved golden ones, and lateral curved lines in front which meet behind the head, and a pale golden scaled area over the wings; the median line forks round the bare space in front of the scutellum, three lines of black bristles which are most prominent behind, and also numerous others over the roots of the wings; prothoracic lobes with narrow-curved golden scales; scutellum brown with golden narrow-curved scales and black border-bristles, five to the mid lobe; metanotum brown; pleurae pale brown with white to grey puncta.

Abdomen deep black and white; basal segment all black; second segment with three white spots placed medianally, one in the centre and two lateral, the next four segments with curved white narrow bands, the two basal towards the basal part of the segments, the two apical towards the apical borders of the segments; the seventh segment with two lateral white spots about the middle of the segment; apical segment all black, the white bands spread out into prominent median lateral spots; venter with broad basal white bands, apical borders of the segments yellowish-brown.

Legs deep brown; tibiae and first tarsals bristly; coxae and bases and under surface of femora pallid; ungues of fore and mid legs equal and simple, of hind equal and simple.

Wings typically scaled; the first sub-marginal cell con-



Fig. 248.
Wing of *Skusea funerea*, var. *ornata*. ♀. Theobald.

siderably longer and a little narrower than the second posterior cell, its stem about half the length of the cell, its base nearer the

base of the wing, stem of the second posterior longer than the cell and longer than the stem of the first sub-marginal; posterior cross-vein not quite its own length distant from the mid; pseudo-vein between the fifth and sixth very distinct.

Length.—3·8 to 4·5 mm.

Habitat.—New Guinea, Sattelberg, Huon Gulf (Biró) 1899; Friedrich-Wilhelmshafen (Biró) 1900.

Observations.—Described from a series of eight ♀'s. This variety differs from the type species in having an ornamented thorax, and in the slightly different positions of the abdominal bands. I can see no reason, however, to treat it as a distinct species, as structurally it is the same as the type from Australia. The specimens show variation in regard to the cephalic ornamentation, some being as described in the type variety, others as in the typical Australian form.

Type in the National Museum of Hungary, Budapest.

SKUSEA MEDIOFASCIATA. n. sp.

Head, palpi, proboscis and thorax deep rich uniform brown. Abdomen deep blackish-brown, the segments with median white bands, inclined apically on each side, except on the sixth and seventh segments where there are median lateral white spots. Legs deep brown, unbanded, base and under side of femora pale grey.

♀. Head deep brown, with deep brown flat scales all over, showing dull violet reflections, and with a few dull ochreous ones at the sides, deep brown chaetae bordering the eyes, those on each side pointing inwards (traces of a few paler narrow-curved scales in the middle line basally); palpi and proboscis deep brown, with dull violet reflections; antennae deep brown, the second segment testaceous basally.

Thorax deep blackish-brown, with dense irregularly disposed dull brown narrow-curved scales and deep brown chaetae; scutellum black, with paler narrow-curved scales and eight deep brown border-bristles to the mid lobe; metanotum deep brown; pleurae deep brown, with patches of white scales.

Abdomen deep blackish-brown to black, the second to fifth segments with white bands running across them on the basal half of the segments, the sixth and seventh with a white spot on each side at the same level as the bands; basal segment completely clothed with dark scales and dull brown hairs; the apical segment all dark; posterior border-bristles pale, rather short; the white bands bent around sharply to the base of the segments

at the sides, as also do the spots on the sixth and seventh segments.

Legs deep brown; femora pale basally and ventrally, with pale bristles; fore and mid ungues equal and uniserrate, hind equal and simple.

Wings with short fork-cells; the first sub-marginal longer and narrower than the second posterior, its base very slightly nearer the apex of the wing, the stem about two-thirds the



Fig. 249.
Wing of *Skusea mediofasciata*. ♀. n. sp.

length of the cell; the second posterior cell is wide and its stem as long as the cell; posterior cross-vein not quite twice its own length distant from the mid cross-vein. Halteres with deep testaceous stem and fuscous knob.

Length.—4·5 to 4·8 mm.

♂. Head and thorax similar to the ♀. Antennae

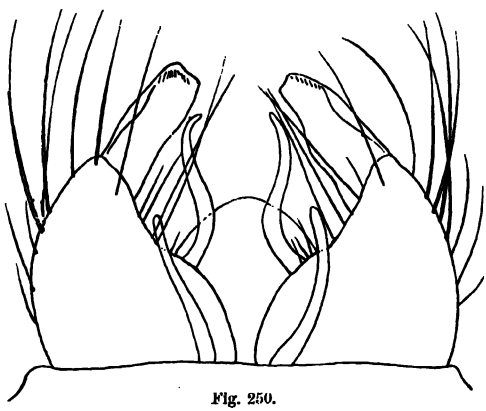


Fig. 250.
Male genitalia of *Skusea mediofasciata*. n. sp.

banded grey and brown, apex deep brown, basal segment deep brown, second segment swollen, testaceous, hairs deep

brown; palpi very small, of three segments, the apical nipple-like.

Abdomen not so plainly banded as in the ♀.

Fore and mid ungues unequal, the larger with a large tooth, the smaller simple.

Wings with very short fork-cells, the first sub-marginal about the same length as the second posterior, but narrower, its stem a little longer than the cell, stem of the second posterior longer than the cell; posterior cross-vein slightly more than its own length distant from the mid. The genitalia very marked, the claspers as thick, blunt lobes; a large median basal semicircular swelling; two curved sword-like harpes, bent at the base.

Length.—4·3 mm.

Habitat.—India (Dr. Christophers).

Observations.—Described from three ♀'s and one ♂. It comes very near *Skusea funerea*, Theobald, but can at once be told by the fore and mid ungues being uniserrated.

The markings on the abdomen are also different.

The male genitalia are very marked.

Skusea culiciformis. Theobald (1905).

Ann. Mus. Nat. Hung. III., p. 77 (1905).

Head deep brown, with ochreous reflections, nape testaceous; thorax brown, with brown scales; abdomen brown, with basal creamy bands. Legs, proboscis, palpi and antennae uniformly brown.

♀. Head brown, clothed with small flat scales, brown in some lights, ochreous and clay-coloured in others, a few brown upright forked scales on the nape; proboscis deep brown; palpi brown; antennae brown, basal segment light testaceous.

Thorax shiny brown, with small narrow-curved brown scales; scutellum brown to testaceous, with brown narrow-curved scales, seven posterior border-bristles to the mid lobe; metanotum brown; pleurae pale yellowish-brown.

Abdomen brown, with basal creamy bands, venter similarly adorned.

Legs uniformly brown, with bronzy-ochreous reflections in some lights; ungues equal and simple.

Wings with short fork-cells, scales *Taeniorhynchus*-like, but small, the first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the apex of the wing, stem

of the second posterior as long as the cell; posterior cross-vein nearly three times its own length distant from the mid cross-vein.

Length.—4 mm.

Habitat.—Panmomu River, New Guinea (Loria), (ix., xii., 1892).

Observations.—Described from a single ♀. It resembles



Fig. 251.
Wing of *Skusea culiciformis.* ♀. Theobald.

generally *Culex fatigans*, but is stouter in build and, as can be seen by the scale structure, belongs to quite a different genus.

It can be told from *S. funerea* (Theob.), by the simple abdominal banding and different venation and from *Skusea multiplex* (Theob.), by having basal abdominal bands and simple ungues.

The type is in the National Museum of Hungary, Budapest.

SKUSEA DIURNA. Theobald (1903).

The Entomologist, Vol. XXXVI., p. 259 (1903).

Head black, with a narrow pale median line and paler at the sides; proboscis brown; thorax richly brown scaled; pleurae black with silvery puncta; abdomen black, unbanded, with basal lateral silvery spots. Legs dark brown, unbanded, paler at the base and beneath the femora; femora rather swollen.

♀. Head covered with flat black scales, a narrow indistinct line of dull creamy ones and a few pale dull blue ones at the sides; a few thick black bristles projecting over the golden eyes; clypeus black, truncated with a slight median depression, in certain lights with grey sheen; palpi and proboscis brown, the former very short; antennae brown, base of the second segment bright testaceous.

Thorax black, covered with rather long, rich brown narrow-curved scales, a few paler scales in front over the head; scutellum deep brown with narrow-curved brown scales and five median border-bristles; pleurae brown with silvery white puncta.

Abdomen black, with small, nearly basal, lateral white spots; border-bristles dull brown; venter brown.

Wings with brown scales; the first sub-marginal cell a little onger, but no narrower than the second posterior cell, its stem about two-thirds the length of the cell, its base nearly level with that of the second posterior cell; stem of the latter as long as the cell; posterior cross-vein about one and a half times its own length distant from the mid cross-vein.

Halteres with ochreous stem and fuscous knob.

Legs deep brown, unbanded; femora rather thickened, slightly hairy; tibiae with long bristles and a row of short ones, also a few apical bristles; ungues equal and simple.

Length.—4 mm.

Habitat.—Jugra, Kuala Lumpur, Federated Malay States (Dr. Durham).

Time of appearance.—September.

Observations.—Described from a ♀ in perfect condition, bred out by Dr. Durham from a larva collected in the hospital reservoir at Jugra. It certainly comes well in the Genus *Skusea*, but there are only five mid-scutellar bristles. It is a day flyer. In many respects it bears a strong remblance to *Skusea multiplex*, Theobald, but differs in having simple ungues and an unadorned thorax.

Genus **LEPTOSOMATOMYIA.** Theobald.

Ann. Mus. Nat. Hung. III., p. 110 (1905).

Head clothed mostly with flat scales, a few narrow-curved ones in the middle line and upright forked scales behind. Antennae in the ♂ slightly plumose; palpi in ♂ very short.

Thorax with narrow-curved scales, also the prothoracic lobes; scutellum with small flat scales to the mid lobe, narrow-curved ones on the lateral lobes. Fork-cells of ♂ short; median vein-scales mostly in single line; lateral vein-scales linear, rather thick.

Distinguished from other *Aedine* genera by the cephalic and scutellar squamose characters.

Leptosomatomyia lateralis. Theobald (1905).

Ann. Mus. Nat. Hung. III., p. 110 (1905), Theobald.

Head deep brown with a few median scales; palpi, proboscis and antennae deep brown. Thorax deep brown, with brighter

brown scales; pleurae paler with patches of white scales. Abdomen black with basal white lateral spots. Legs brown, pale basally.

♂. Head deep brown, mostly clothed with deep brown flat scales, some small golden narrow-curved ones around the eyes, and a few in the mid line of the head, behind some dull yellowish upright forked scales. Proboscis deep brown; palpi very short, brown; antennae lightly plumose, brown.

Thorax deep brown, with rather large narrow-curved bronzy scales in the middle, a few golden ones at the sides and in front, a few dark bristles over the roots of the wings; prothoracic lobes with small golden narrow-curved scales; scutellum paler, the mid lobe with small flat scales, showing brown, violet and ochreous reflections, the lateral lobes with dull creamy narrow-curved scales; pleurae pale brown with patches of flat silvery scales; metanotum brown. Abdomen narrow and long, slightly expanding apically, deep black, with basal lateral white spots. Legs brown with bronzy reflections; coxae pale and the under side of femora pale brown; fore ungues unequal, the larger with a small tooth towards the apex, the smaller simple; mid ungues unequal, both simple; hind small equal and simple. Wings with the fork-cells short, the first sub-marginal narrower, but no longer than the second posterior cell, its stem the same length as the cell, its base level with that of the second posterior cell; stem of the second posterior the same length as the cell; posterior cross-vein longer than the mid about its own length distant from it, the mid much shorter than the supernumerary, thus bringing the third long vein close to the fourth. Halteres with testaceous stem and fuscous knob.

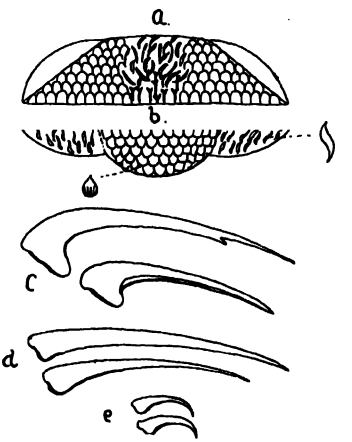


Fig. 252.

Leptosomatomyia lateralis. ♂. Theobald. a and b, Cephalic and scutellar adornment; c, d, e, fore, mid and hind ungues of ♂.

Length.—4 mm.

Habitat.—Muina, New Guinea (Biró, 1900).

Time of capture.—31st December.

Observations.—Described from a perfect ♂, partly dissected. It cannot be placed in any known *Aedine* genus, so a new genus has been made for it. The abdomen is very long and thin, but whether this character will occur also in the ♀ remains to be seen.

The type is in the National Museum of Hungary, Budapest.

Genus **HAEMAGOGUS.** Williston.

The genus *Haemagogus* is now divided into three genera, *Haemagogus*, Williston (Sen. St.); *Gualteria*, Lutz, and *Cacomyia*, Coquillett.

Gualteria is easily told by the curious apical expansion of the last few segments ventrally, and *Cacomyia* by the abdomen of the ♂ having a large cluster of outstanding blunt spines on the under side of the penultimate segment.

Dr. Lutz places these in a separate sub-family *Haemagoginae*.

Genus **HAEMAGOGUS.** Williston.

Trans. Ent. Soc. Lond., p. 271 (1896), Williston; Mono. Culicid. II., p. 238 (1901), Theobald; Gen. Ins. Fam. Culicid., p. 37 (1905), Theobald; Mosq. do Brasil. 4 (1904), Lutz in Bourroul; Class. Mosq. N. and M. Ameri. Tech. Se. 11., U.S. Dept. Agri. Div. Ent. 16 (1906), Coquillett.

Haemagogus cyaneus. Fabricius (1805).

Culex cyaneus. Fabricius (1805).

Haemagogus splendens. Williston (1896).

Aedes splendens. Giles (1900).

Syst. Antl. 35, 9 (1805). Fabricius; Dipt. Exot. I., p. 8 (1821), Wiedemann; Mem. d. l. Soc. d'hist. nat. de Paris III., p. 405, 8 (1827), Robinson-Desvoidy; Hndbk. Gnats, p. 358 (1900), Giles, and 2nd Ed., p. 495 (1902), Giles; Mono. Culicid. II., p. 239, and III., p. 308, Theobald; Trans. Ent. Soc. Lond. p. 272 (1896) (=*splendens*), Williston; Les Moust., p. 412 (1905), Blanchard; Mosq. do Brasil, p. 13 (1904), Lutz in Bourroul.

Additional locality.—Para (Prof. Goeldi and Dr. A. Lutz).

HAEMAGOGUS LEUCOMELAS. Lutz (nom. nud.).

Mosq. do Brasil, p. 13 (1904).

Lutz refers by the above name to another species besides his *capricornii* described here.

In his table * of Brazilian *Haemagogus* he mentions it as being white and blue dorsally.

HAEMAGOGUS CAPRICORNII. Lutz (nom. nud.).

Head bright blue. Thorax deep bronzy green; pleurae silvery white. Abdomen metallic violet, with dull white median basal patches on the last three segments. Legs with deep metallic violet and deep blue reflections; fork-cells very small.

♀. Head clothed with flat bright blue shiny scales, somewhat darker behind; with black chaetae projecting forwards; palpi and proboscis deep metallic violet; antennae brown, basal segment frosty.

Thorax black, clothed with flat spindle-shaped apple-green and bronzy scales irregularly disposed, becoming flatter, denser and larger in front of the scutellum; scutellum with large flat bright blue scales; prothoracic lobes with flat blue and green scales; pleurae densely white scaled.

Abdomen deep violet, bluish at the base, sixth and seventh segments with median white basal spots, the sixth with two black chaetae arising from the apical portion of the segment, not as long as the following segment; basal silvery-white lateral spots on the last four segments, the sides of the basal segments with a continuous white line; venter white.

Legs deep violet and purple, with metallic reflections, base and under side of femora silvery white; fore and mid ungues equal and uniserrate, hind equal and simple.

Wings with small fork-cells; the first about the same length but narrower than the second, its stem longer than the cell, stem of the second posterior a little longer than the cell; posterior cross-vein not quite twice its own length distant from the mid. Halteres with some violet scales at the apex.

* "1. Principal colours white and blue dorsally... *leucomelas.* Lutz.
Principal colours blue and dark violet.
2. First fork-cell long, more than twice the length of the stem; post. cross-vein four times its length from mid *cyaneus.* Fabricius.
3. First fork-cell shorter than its stem; post. cross-vein its own length from the mid ... *capricornii.* Lutz."

Length.—5 mm.

Time of capture.—November.

Habitat.—Brazil (Dr. Lutz).

Observations.—Described from a perfect ♀ given me by Dr. Lutz under this name.

Genus **GUALTERIA.** Lutz.

Mosquitos do Brasil, Bourroul, p. 47–54 (1904).

Head with flat scales all over. Palpi short in both sexes. Thorax with spindle-shaped scales in front, flat behind and on the scutellum and prothoracic lobes.

Abdomen with the apical segments expanded apically in a ventral direction.

Wings with scales similar to *Stegomyia.*

Close to *Haemagogus,* but easily told by the peculiar form of the apical abdominal segments on the venter.

Lutz describes two species—

(i) *Gualteria oswaldi.*
(ii) *Gualteria fulvithorax.*

both from Brazil.

They may be told as follows:—

Mesonotum white and black *oswaldi.* Lutz.
Mesonotum dusky gold *fulvithorax.* Lutz.

Gualteria oswaldi. Lutz (1904).

Mosquitos do Brasil, pp. 47 and 66 (1904).

Head black with a V-shaped silvery white median area and silvery border around the eyes; proboscis and palpi black with violet reflections. Thorax black with silvery-white scales forming a spot in front, on the prothoracic lobes and two broad transverse lines on the pleurae. Abdomen black with purplish blue reflections and silvery-white basal spots, showing on the dorsum and last few segments, the apical segments projecting ventrally. Legs black, unbanded, femora with two snow-white spots, one apical, legs showing metallic violet reflections.

♀. Head black, clothed with flat black scales, a median double row of white ones expanding into a broad area between the eyes, a narrow rim around them and expanding out on each

side, long black chaetae projecting forwards from the edge of the eyes; clypeus, palpi and proboscis black with metallic violet reflections; antennae black, second and third segments with black scales.

Thorax shiny black, clothed with spindle-shaped black scales with bronzy reflections, a patch of silvery-white ones in front, two patches on each side of the mesonotum, which extend down the pleurae as two wide transverse bars; prothoracic lobes black scaled at the base, snowy white at the apex; the back of the mesonotum with metallic black and violet flat scales, passing on to the scutellum, where they are also large and spatulate, the mid lobe with a few flat white apical ones; metanotum black. Halteres thick with pale stem and dusky knob; chaetae of thorax black.

Abdomen black with metallic violet reflections with basal lateral silver patches, which extend on to the dorsum on some of the apical segments, the apical segment with a basal white band; the penultimate and antepenultimate segments expanded ventrally.

Legs deep black with blue and violet reflections, femora of fore and mid legs with two snow-white spots, one apical; hind femora with basal two-thirds creamy beneath, and a snow-white apex; fore and mid ungues equal and uniserrate; hind (?).

Wings with brown scales, dark along the costa; fork-cells short; the first sub-marginal longer and narrower than the second posterior, its base just a little nearer the base of the wing,



Fig. 253.
Wing of *Gualteria oswaldi*. ♀. Lutz.

its stem about half the length of the cell; stem of the second posterior about three-fourths the length of the cell; posterior cross-vein longer than the mid and about one and a half times its own length distant from it; scales very similar to *Stegomyia*.

Length.—4·8 to 5 mm.

Time of capture.—March.

Habitat.—Sande and Goyaz, Brazil (Dr. Lutz).

Observations.—Redescribed from two ♀'s given me by Dr. Lutz.

It is a very marked species of general black hue, but in certain lights the abdomen is blue and violet and shows four white spots and a white apical band; the two fore and mid femoral spots are also very pronounced characters.

Genus **CACOMYIA.** Coquillett.

Class. Mosq. N. and M. America, Tech. Se. 11, U.S. Dept. Agri. Div. Ent., p. 16 (1906).

Coquillett separates *Haemagogus albomaculatus* and *H. equinus* from the genus *Haemagogus*, and places them in a new genus which he calls *Cacomyia.*

The difference seems very slight, but still sufficiently marked to render the two genera easily separable.

The characters are as follows:—"Base of the first sub-marginal cell noticeably nearer the apex of the wing than is the base of the second posterior cell; palpi of the ♂ about one half as long as the proboscis; abdomen of the ♂ with a large cluster of outstanding blunt spines on the under side of the penultimate segment."

Unfortunately Lutz's genus *Gualteria* resembles this in all respects save in that the first sub-marginal has its base nearer the base of the wing than that of the second fork-cell.

The two species are easily separated as below:—

Abdomen with white scales in the middle of the last two segments only *albomaculata.* Theobald.
Abdomen with white scales in the middle of some of the other segments *equina.* Theobald.

Cacomyia equina. Theobald (Coquillett) (1903).

Haemagogus equinus. Theobald (1903).

The Entomologist, XXXVI., p. 282 (1903); Mosq. Jamai., p. 37 (1905), Theobald; Mosq. N. and M. America, p. 25 (1906), Coquillett.

Head metallic violet, white between the eyes in front; palpi and proboscis black; antennae pale brown. Thorax metallic green; pleurae snowy white. Abdomen bright metallic violet, with three prominent and one faint silvery-white basal bands

and white lateral spots. Legs unbanded, deep brown; femora white beneath. Wings with violet reflections, iridescent.

♀. Head clothed with flat metallic violet scales, except a patch between the eyes, which are white, and at the sides, where they are grey and black; black bristles project over the eyes, and there is a trace of a narrow pale border surrounding them; clypeus with a frosty sheen; palpi black; proboscis black, curved upwards, nearly as long as the whole body; antennae pale brown, basal segments deep brown, with dusky scales on the large basal and second segments.

Thorax black, covered with large flat apple-green metallic scales, rounded at their apices and irregularly disposed over the mesonotum; a patch of almost silvery-white ones just in front of the roots of the wings, with also long dense black bristles; scutellum with flat green and blue scales and black border-bristles; prothoracic lobes and pleurae silvery white.

Abdomen rich metallic violet, the first segment with an oblique white line on each side; the second and third unadorned, the fourth with a few large basal white scales; the fifth, sixth and seventh segments with basal white bands; border-bristles short and black; each segment has a large basal silvery white lateral spot, venter pure silvery white; each segment with a median black spot; the last two segments project downwards and give the appearance of two ventral black tufts.

Legs unbanded, deep brown, with metallic violet reflections, and a pale knee spot to the mid and hind pair; femora white beneath; ungues small, equal and simple.

Wings faintly tinged with brown, metallic violet and iridescent in certain lights; first sub-marginal cell slightly longer and narrower than the second posterior cell, its base nearer the apex of the wing, its stem longer than the cell; stem of the second posterior cell longer than the cell; posterior cross-vein rather more than its own length distant from the mid cross-vein.

Halteres with ochraceous stem and fuscous knob.

Length.—4 to 5 mm.

Habitat.—Kingston, Jamaica (Dr. Grabham).

Time of capture.—August (24th).

Observations.—Described from a single perfect specimen. Dr. Grabham took this brilliant species feeding on a horse. He captured two specimens, and mentions that "it is by far the most brilliant species found here, and is evidently uncommon."

They were taken at 7 P.M. at the lower end of Old Pound Road.

This insect resembles *Haemagogus cyaneus*, Fabricius, but the venation is different, for the first sub-marginal cell is smaller and its base is nearer the apex of the wing, whilst in *H. cyaneus* it is nearer the base of the wing; moreover, the abdomen in *H. cyaneus* is not adorned as in this insect.

It also bears some resemblance to *C. albomaculata*, Theobald, but the abdomen has not the curious chaetotactic characters seen in that species (*vide* Vol. III. Mono. Culicid., Fig. 171, p. 309).

There are also no traces of the two median abdominal spots seen in *C. albomaculata*, but the body is marked with bands.

Sub-Family **URANOTAENINAE.** Mitchell.

In this sub-family the first fork-cell is *very small*, always smaller than the second posterior cell, and its base nearer the apex of the wing.

Four genera occur, namely, *Uranotaenia*, Arribalzaga; *Pseudouranotaenia*, Theobald; *Anisocheleomyia*, Theobald; and *Mimomyia*, Theobald.

They tabulate as below:—

First fork-cell very small.	
Male ungues normal.	
No inflated wing scales	*Uranotaenia.* Theobald.
Inflated wing scales present	*Pseudouranotaenia.* Theobald.
Male ungues broad and plate-like	*Anisocheleomyia.* Theobald.
First fork-cell nearly as large as the second posterior cell	*Mimomyia.* Theobald.

Genus **URANOTAENIA.** Arribalzaga.

Dipt. Argent., p. 63 (1899), Arribalzaga; Mono. Culicid. II., p. 241 (1901), Theobald; Genera Insect Fam. Culicid., p. 36 (1905), Theobald.

This genus is proving to be a large one. The following species are now known: *U. pulcherrima*, Arri.; *U. geometrica*,

Theob.; *U. sapphirina*, Osten Sacken; *U. annulata*, Theob.; *U. nataliae*, Arri.; *U. pygmaea*, Theob.; *U. caeruleocephala*, Theob.; *U. malayi*, Theob.; *U. alba*, Theob.; *U. apicalis*, Theob.; *U. pallidoventer*, Theob.; *U. lowii*, Theob.; *U. socialis*, Theob.; *U. testacea*, Theob.; *U. atra*, Theob.; *U. minuta*, n. sp.; *U. fusca*, n. sp.; *U. balfouri*, Theob.

The genus is now known to occur in Asia as well as Africa and N. and S. America.

URANOTAENIA PULCHERRIMA. Arribalzaga (1899).

Dipt. Argent., p. 65 (1899); Mono. Culicid. II., p. 244 (1901).

Additional locality.—New Amsterdam, British Guiana (Dr. Rowland).

URANOTAENIA SAPPHIRINA. Osten Sacken (1868).

Aedes sapphirinus. Osten Sacken (1868).

Trans. Ent. Soc. America, II., p. 47 (1868); Mono. Culicid. II., p. 249 (1901), Theobald; Bull. No. 4 (N.S.), Div. Ento. Dept. Agri. U.S. America, p. 24 (1896); Howard; Gnats or Mosq., p. 354 (1900), p. 492 (1902), Giles; Journ. N.Y. Ent. Soc. IX., p. 180 (1901), Dyar; Mosq. N. Jersey, p. 337 (1905), Smith.

Additional localities.—Lahaway, Trenton, Cape May, Metâ de Conk, Irvington in New Jersey (J. B. Smith); Long Island

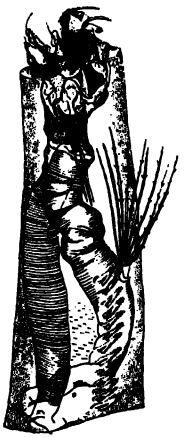


Fig. 254.
Siphon of *Uranotaenia sapphirina*. Osten Sacken. (After Felt.)



Fig. 255.
Labial plate of *Uranotaenia sapphirina*. (After Felt.)

(Dr. Dyar); Mississippi State (Professor Glenn Herrick); Fort Barrancas, Florida (Miss Ludlow).

Observations.—Numerous recent observations have been made on the larvae by Professor Smith, Dr. Dyar, and others.

The eggs are laid in a boat-shaped mass on the surface of water, more angular and less regular than in *Culex*. The young larvae when feeding at the surface hold their body more parallel to the surface than *Culex*, and to some extent resemble *Anophelines* in position. They are fond of resting below the leaves of Lemna. This species breeds all the summer, preferring warm stagnant pools containing *Spirogyra*. They have been found in June, August, and September in New Jersey. It is a local breeder, being found in and about the same places each year and always



Fig. 256.
Pecten teeth of *U. sapphirina*.
(After Felt.)

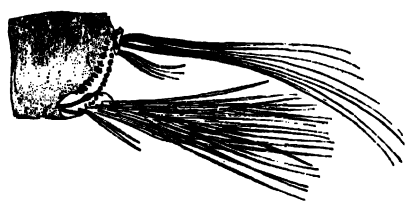


Fig. 257.
Terminal segment of larva of *U. sapphirina*.
(After Felt.)

in permanent bodies of water. It is not known how the winter is passed.

The larva when full grown is 5 to 5·5 mm. long, yellowish-brown or greyish in colour; head dark brown, but may be marked with yellow or pale brown; antennae short, a few short spines on the surface, apex with two long and two short spines and a small articulating process; labial plate triangular with nine or eleven blunt teeth largest at the apex, smallest towards the base; eighth segment with large lateral plates, with a row of six to nine stout spines on edge, each finely fringed with hairs; spines of siphon composed of twelve to fourteen in each row, no basal teeth, but with a fringe of long fine hairs all around them.

The pupa resembles that of *Culex*, but is very small and has unusually long air tubes.

URANOTAENIA MINUTA. n. sp.

Head deep brown in the middle, azure blue at the sides and in front.

Thorax dark brown in the middle, pale brown at the sides, with a patch of flat azure blue scales in front of the roots of the wings. Abdomen brown, some of the segments with apical lateral pale blue spots. Legs deep brown, the hind pair with the apical half of the third tarsal, whole of the fourth white and the fifth white in some lights, dusky in others. Wings with a pale blue patch at the base.

♀. Head deep brown, clothed in the middle with flat deep velvety-brown scales and with flat azure blue ones at the sides and a few forming a median patch in front; antennae deep brown; also the proboscis, which is much swollen apically.

Thorax deep brown in the middle, bright brown at the sides, clothed with bronzy curved scales which are broader on the dark area than on the pale, a line of pale blue flat scales on each side in front of the roots of the wings, and pale blue scales on the prothoracic lobes, chaetae long, brown; pleurae brown, with pale blue puncta; scutellum pale brown, with four border-bristles to the mid lobe (denuded).

Abdomen deep brown, with three (?four) apical pale blue lateral spots and short brown border-bristles.

Legs deep brown, with violet and purple reflections, in some lights bronzy; the hind legs have the apical half of the third tarsal, and whole of the fourth snowy-white, the fifth appears white in some lights, dusky in others; ungues equal and simple.

Wings with brown scales, the lateral ones scanty, long and thin, a line of flat azure-blue scales at the base of the fifth vein; median vein-scales single, very narrow; costa spiny, dark brown; first sub-marginal cell smaller and narrower than the second posterior, its base nearer the apex of the wing, its stem about three and a-half times as long as the cell, close to the first long vein; stem of the second posterior not quite twice as long as the cell; the supernumerary vein longer than the mid and sloping backwards; the posterior as long as the mid, about one and a-half times its own length distant from it; joining the upper branch of the fifth at about its own length distant from the fork, the upper branch of the fifth bending sharply where it joins it;

the wings are pale at the base; halteres with pale stem and fuscous knob.

Length.—2 mm.

Time of capture.—January.

Habitat.—New Amsterdam, British Guiana (Dr. Rowland).

Observations.—Described from a perfect ♀, except that the scutellum is rubbed. It is a very small species, easily told by the cephalic adornment, the white hind tarsals and non-banded abdomen, with apical pale blue scales. The blue area at the base of the wing is on the fourth and fifth veins. The antennae appear very long.

URANOTAENIA LOWII. Theobald (1901).

Mono. Culicid. II., p. 339 (1901).

Additional locality.—New Amsterdam, British Guiana (Dr. Rowland).

URANOTAENIA TESTACEA. Theobald (1905).

Ann. Mus. Nat. Hung. III., p. 113 (1905).

Thorax bright testaceous, with azure-blue prothoracic lobes; pleurae brown with a pale blue line; head dark in the middle, pale blue round the eyes. Abdomen brown, unbanded, venter yellow. Proboscis, palpi and legs brown, the hind and mid tarsals pale, especially the last two segments.

♀. Head clothed with flat black scales in the middle, azure-blue ones around the eyes and at the sides; antennae deep brown, basal segment testaceous, the second segment as long as the two following ones; palpi and proboscis brown, apex of latter swollen and distinctly hairy.



Fig. 258.
Wing of *Uranotaenia testacea*. ♀. Theobald.

Thorax bright testaceous, with narrow-curved dark scales; prothoracic lobes with flat azure-blue scales; scutellum with flat scales black; metanotum brown, pale in the middle; pleurae testaceous, with a line of pale blue scales.

Abdomen brown, with brown scales; yellow ventrally.

Legs brown, unbanded, with ochreous reflections, the last two or three tarsal segments clayey-white in certain lights on the mid and hind legs; ungues small, equal and simple.

Wings of typical venation and squamose characters; stem of the first sub-marginal twice as long as the cell; stem of the second posterior one and a half times as long as the cell; posterior cross-vein much longer than the mid, sloping backwards, and close to the base of the upper branch of the fifth long vein, large clavate scales on the branches of the first sub-marginal and its stem near the cell and on both sides of the third long vein, also some on both sides of the branches of the second posterior cell; upper costal border very distinctly spinose.

Halteres with testaceous stem and deep brown knobs.

Habitat.—Singapore (Biró, 1902).

Observations.—Described from two perfect ♀'s. They can at once be distinguished by the cephalic ornamentation, absence of thoracic ornamentation except the blue prothoracic lobes. The mid and hind legs have the last two or three tarsals apparently pale, but in some lights the legs are unicolorous.

Type in the National Museum of Hungary, Budapest.

URANOTAENIA BALFOURI. Theobald (1905).

First Rept. Gord. Coll., Well. Labs., p. 82 (1905), ♀; Second Rept., p. 82 (1906), ♂.

Head with a broad black median band, pale blue on each side. Thorax brown, with pale blue prothoracic lobes and a pale blue area in front of the roots of the wings. Abdomen brown, unbanded. Legs brown, unbanded. Wings with brown scales, except a short row at the base of the fifth long vein.

♀. Head black, clothed in the middle with flat black scales forming a broad median area, sides clothed with flat pale blue scales; viewed in certain lights the back of the dark area of the head reflects deep rich blue colours; four prominent curved black bristles in front which project medianally and some short black ones between; antennae deep brown with paler nodes, basal segment pale reddish-brown; clypeus pale reddish-brown; palpi black; proboscis black, nearly as long as the whole body.

Mesothorax brown, with small narrow-curved brown scales a

short blue line on each side before the roots of the wings; prothoracic lobes clothed with flat pale blue scales; scutellum brown, testaceous along the edge, lateral lobes with small flat black scales (mid lobe rubbed); four posterior border-bristles to the mid lobe; metanotum deep brown; pleurae brown, with a small median patch of pale blue scales.

Abdomen deep brown, with rich deep brown scales and pale golden border-bristles, on the sides of the last three or four apical segments are traces of basal brown scales; venter pale ochreous with brown border-bristles; legs deep brown, bases testaceous, femora pale beneath; ungues small equal and simple; wings with brown scales except at the base of the fifth long vein where there is a row of broad flat white scales; costa and first long vein with very dark scales, long lanceolate and prominent lateral vein-scales on the second and third veins and a few on the fork of the fourth; the second long vein lying very close to the first, the upper branch of the small first sub-marginal cell being particularly closely applied; the stem of the first sub-marginal cell about two and a half times as long as the cell, that of the first posterior slightly longer; posterior cross-vein twice the length of the mid and about its own length distant from it; mid cross-vein much shorter than the supernumerary; the scales on the fifth (except base) are dark and also on the sixth except at the apex which is nude in the specimen examined; halteres with testaceous stem and black knob.

Length.—2 mm.

♂. Head deep brown, clothed in the middle with flat dusky scales, the sides with flat grey and blue scales, the head deep brown behind, there are also a few upright deep brown forked scales; cephalic chaetae black.

Antennae plumose, the segments half brown, half grey, plume hairs dark brown, basal segment very large deep brown; clypeus prominent black; palpi very minute, deep black; proboscis black, swollen apically.

Mesothorax deep brown with narrow-curved brown scales, apparently a line of blue scales before the root of the wings as in the female; scutellum brown with deep brown small flat scales, and four bristles to the mid lobe; metanotum pale brown basally dark brown apically; pleurae brown with some pale and azure blue flat scales.

Abdomen as in the female.

Legs deep brown with bronzy sheen (ungues absent).

Wings with brown scales very similar to those of the female, and with a row of flat white scales at the base of the fifth long vein; the upper branch of the first fork-cell not as close to the first longitudinal vein as in the female; the stem of the second posterior about one and a half times the length of the second fork-cell, the mid cross-vein longer than the others.

Length.—2 mm.

Habitat.—White Nile and Pibor (Dr. Balfour).

Observations.—Described from a nearly perfect male and female, but with somewhat rubbed body. Two other females are just as in the type. The male wing venation cannot well be made out, as only one wing was left on the specimen, and that was crumpled, but the general appearance is that of the female. Dr. Balfour states that it is very common on the Pibor, and very annoying in the evening. It is a very small species that may easily get through mosquito netting.

It is closely related to *Uranotaenia caeruleocephala*, Theobald (Mono. Culicid., Vol. II., p. 256), but can be told at once by the head having a broad area in the middle of flat black scales, and by the thoracic markings being blue instead of white.

URANOTAENIA ATRA. Theobald (1905).

Ann. Mus. Nat. Hung., III., p. 114 (1905).

Head black with dull brownish violet scales. Thorax black with brown scales, and a grey scaled line over the roots of the wings. Abdomen black. Legs uniformly dark brown.

♀. Head black with flat dusky scales, the lateral areas showing dull brownish violet, scattered over the whole surface a few large deep brown upright forked scales. Palpi, antennae and proboscis deep brown.

Thorax black with bronzy narrow-curved scales, except for a line of grey ones over the roots of the wings, and black bristles over the roots of the wings; scutellum black with flat black scales; metanotum nude, black; pleurae black (denuded).

Abdomen black, unbanded; venter black.

Legs brown, the swollen mid femora testaceous below, the others at the base; ungues small, equal and simple.

Wings with the first sub-marginal half the size of the second, its stem three times as long as the cell. Stem of the second posterior one and a half times as long as the cell; posterior cross-

vein considerably longer than the mid, not its own length distant from it.

Halteres with stem yellowish at the base, black above, and also on the knob.

Length.—2 mm.

Habitat.—Muina, New Guinea (Biró, 1900).

Observations.—Described from a single ♀. It differs from all known *Uranotaenia* in the general blackish-brown hue and absence of adornment, except the grey line of scales on each side over the roots of the wings.

Type in the National Museum of Hungary, Budapest.

URANOTAENIA FUSCA. n. sp.

Head dark brown, paler at the sides; antennae of ♀ with densely hairy internodes. Abdomen deep blackish-brown, unbanded, paler ventrally. Legs deep brown, unbanded.

♀. Head brown, clothed with flat blackish scales, a few paler ones and a few black upright forked scales, much expanded apically and fimbriate. Antennae deep brown, the internodes densely hairy. Clypeus brown; proboscis almost black; palpi deep brown.

Thorax deep brown, with narrow-curved deep dull bronzy-brown scales and long black chaetae; scutellum clothed with flat fuscous scales; metanotum deep brown; pleurae pale, with some pale blue flat scales.

Abdomen uniformly fuscous brown; paler beneath.

Legs deep brown, unbanded, ungues small, equal and simple.

Wings with brown scales of two shades, the median vein-scales small, spatulate, of one series only, the lateral large and clavate, especially on the second, third, branches of the fourth and upper branch of the fifth, and some on the sixth; first submarginal cell not quite as long and narrower than the second posterior cell, its base nearer the apex of the wing, its stem about twice as long as the cell; stem of the second posterior about one and a-half times as long as the cell; supernumerary and mid cross-veins unite, the



Fig. 259.
Wing of *Uranotaenia fusca*. ♀. n. sp.

former sloping very much backwards; the posterior longer than the mid, about its own length distant from it; the second long vein very close to the first. Halteres with pale stem and fuscous knob.

Length.—2·5 to 3 mm.

♂. Similar to the ♀, but with plumose antennae. The basal lobes of the genitalia are short and broad, the claspers are moderately long, straight until the apex, where they are curved, and with fine spine-like hairs on each side on the apical area; a sharp thorn-like segment placed laterally near the end. One pair of ungues only unequal (? the fore), both simple, the larger one only slightly curved.

Length.—2·5 mm.

Habitat.—Mount Aureol, Sierra Leone (Major F. Smith, R.A.M.C.).



Fig. 200. Male clasper of *Uranotaenia fusca*. Theo.

Observations.—A series of two ♀'s and one ♂. It is a small brown obscure *Uranotaenia*, which answers to the description of *mashonaensis*, but the complete flat scaled scutellum, the presence of blue scales on the pleurae and the nearly straight, not much curved, larger ♂ ungues separate them.

URANOTAENIA (?) GEOMETRICA. Theobald (Lutz MS.) (1901).

Mono. Culicid. II., p. 247 (1901).

♂. Antennae plumose, plume-hairs rich brown. Head deep brown, with an azure blue spot on each. Thorax as in ♀. Abdomen and legs as in ♀; fore and mid ungues unequal and simple; hind equal and simple.

Wings much as in the ♀, but the supernumerary cross-vein slightly nearer the base of the wing than the mid and the long posterior cross-vein about half its length distant from the mid.

Genitalia with short basal lobes, claspers nearlys traight, about as long as the basal lobes, apex hook-like, a thin straight process coming from the concave surface of the apical hook, inner border of clasper slightly crenulated, with a few small spines.

Length.—4 mm.

Habitat.—Stanley Town, New Amsterdam, British Guiana.

Time of capture.—September.

Observations.—A male and female sent from British Guiana have not the apical median pale abdominal areas so pronounced as in the Brazilian specimens, and they are somewhat larger, being 3 mm. in the ♀, 4 in the ♂, but there are no structural differences, and are just similar to the type. Better specimens sent from British Guiana show that this is not a true

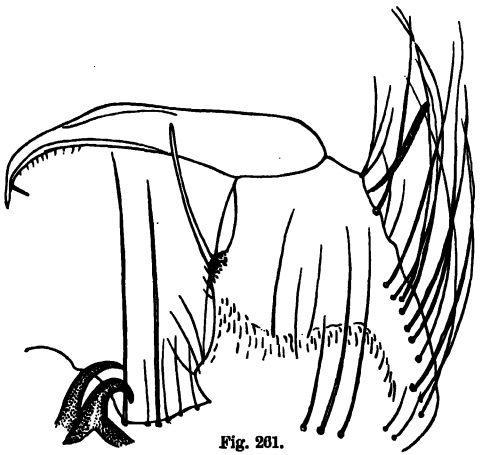


Fig. 261.
Male genitalia of *Uranotaenia geometrica*. Theobald.

Uranotaenia, for the quaint narrow-curved mesothoracic scales are seen as mentioned in the original description to be very prominent, and the first fork-cell is larger than in *Uranotaenia*. One male has the metallic thoracic scales bright mauve.

Genus **PSEUDOURANOTAENIA.** Theobald.

Journ. Eco. Biol. I., p. 33 (1905).

Head clothed with flat scales, with a few upright forked ones; proboscis long, nearly as long as the whole body, swollen apically and hairy in the ♀, not so long in the ♂. Antennae pilose in the ♀, plumose in the ♂; palpi very small in both sexes.

Thorax clothed with narrow-curved scales and a series of flat outwardly projecting scales at the sides of the dorsum; scutellum

with very small flat scales on the mid lobe, somewhat larger ones on the lateral lobes; metanotum nude; pleurae with some flat scales.

Abdomen and legs normal. Wings ornamented; venation much as in *Mimomyia*, fork-cells both small in ♀, the first submarginal smaller than the second posterior, but not so much so as in *Uranotaenia*; wing scales of *Uranotaenia* type, except that

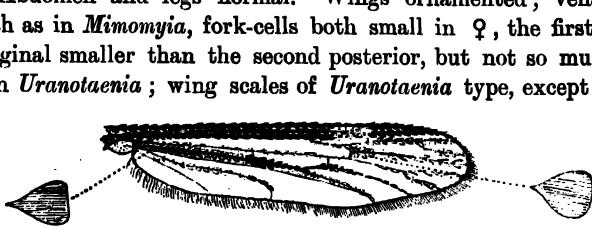


Fig. 262.

Wing of *Pseudouranotaenia rowlandii* to show scales. ♂. Theobald.

there are patches of flat scales on the wing field similar to those at the base of the wing seen in *Uranotaenia*. Fork-cells in ♂ very similar to the ♀, but the upper branch of the first submarginal has a few very large scales only. Prothoracic lobes, with flat scales. Fore ungues of ♂ nearly equal and simple; the mid unequal.

This genus is allied on the one hand to *Uranotaenia* and on the other to *Mimomyia*. The thoracic curved scales resemble those of *Mimomyia* and also the fork-cells—but the wing scales differ considerably.

PSEUDOURANOTAENIA ROWLANDII. Theobald (1905).

Journ. Eco. Biol. I., p. 34 (1905).

Head very pale blue; proboscis as long as the whole body in the ♀, shorter in the ♂, brownish-black; palpi and antennae brown. Thorax brown, with bronzy curved scales and a blue line of flat scales on each side; scutellum brown, with bronzy flat scales. Abdomen deep brown, unbanded and unspotted. Legs deep bronzy brown. Wings ornamented black and white.

♀. Head with occiput large, covered with flat pale blue scales and some black bristles; proboscis deep brown, testaceous at the tip, swelling apically, slightly hairy, nearly as long as the whole body; palpi very small, deep brown; antennae pilose, brown.

Thorax brown with bronzy narrow-curved scales, which have

a narrow golden border, on each side; before and running up to the base of the wings is a line of pale blue flat scales pointing outwards (in some lights they appear almost white), bristles black; scutellum deep ochreous brown, the mid lobe with small flat violet brown scales, the lateral lobes with them more pointed and larger; posterior border-bristles of mid lobe four in number; metanotum deep brown, pleurae brown and ochreous with some patches of flat white scales.

Abdomen clothed with deep blackish brown scales, slightly paler below; posterior border-bristles pale golden.

Legs deep brown, except the coxae and under side of femora, which are paler brown to ochreous, the femora, especially those of the mid legs swollen basally, the apex of femora and to some extent the tibiae with the scales outstanding giving the appearance of apical tufts which are most prominent on the hind legs; ungues small, equal and simple.

Wings ornamented with black, creamy, and white, the silvery white forming a large spot on the dark costal border, at the regions of the cross-veins and at the base of the fifth long vein the silvery white scales are large and spatulate and form a mass at the base of the third long vein and from thence up to the costa to form the costal spot, there are also a few white scales on the branches of the second long vein, the apex of the third and the apex of the lower branch of the fourth, another patch at the base of each branch of the fifth, its base with a long line of large flat white to mauve scales and also the basal part of the sixth; there are also large flat white or mauve scales forming a smaller patch at the base of the fourth vein.



Fig. 263.
Pseudouranotaenia rowlandii. ♀. Theo.

The lateral scales on the second, third, and fourth veins large and spindle-shaped, the dark median scales spatulate and narrow; the smallest of the series of fringe-scales clavate; first fork-cell not quite as long and much narrower than the second posterior cell, its base nearer the apex of the wing, its stem about two and a half times the length of the cell, stem of the second posterior cell about one and a fourth times the length of the cell; posterior cross-vein longer than the mid nearly twice its own length distant from it. Halteres with pale stem and fuscous knob.

Length.—3 mm.

♂. Head much as in the ♀, but with a few short black upright forked scales forming a triangular patch with the base along the nape; antennae plumose, plume-hairs deep brown, internodes grey; palpi very minute, brown with grey sheen at the apices; proboscis deep brown, much swollen apically, and with numerous dark bristles and hairs.

Thorax as in the ♀; prothoracic lobes with flat grey and pale blue scales.

Legs as in the ♀, but the mid pair have denser scales at the apices; ungues of fore legs small, nearly equal and simple, rather broad, and those of the hind legs equal; those of the mid unequal, simple, one large, curved rather irregularly, the last segment of the hind legs with distinct broad spines.



Fig. 264.
Pseudouranotaenia rowlandii. Theobald.
Mid ungues of ♂.

Scales on the wings somewhat similar in arrangement to ♀, but there is a distinct double row of large white scales along the base of the sixth long vein and a few large ones only along the upper branch of the second long vein; the remainder very similar.

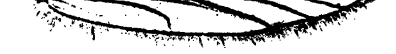


Fig. 265.
Wing of *Pseudouranotaenia rowlandii.* ♂. Theobald.

Time of capture.—July.

Habitat.—Stanley Town, New Amsterdam, British Guiana (Dr. Rowland).

Described from a perfect male and female. It forms a very marked species, the ornamented wings and marked head and thoracic ornamentation at once separating it from any other mosquito that I know of. The colour of the head and thoracic markings vary according to the light especially under the microscope, in some lights the scales show blue, in others almost silvery white. The same applies to the pale scales on the wings.

The large scales forming the larger patches of white become so transparent in a balsam preparation that it is difficult to detect them at all.

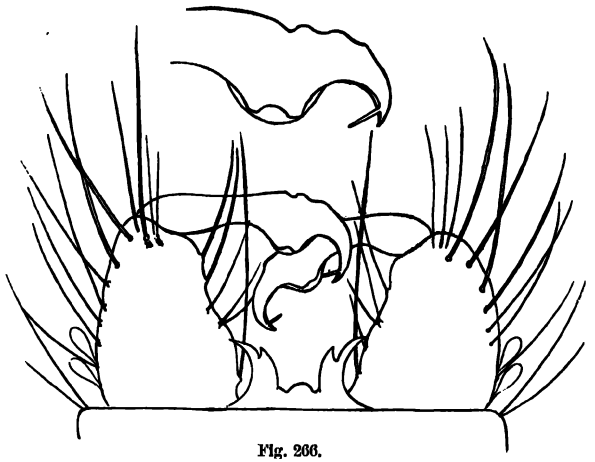


Fig. 266.
Male genitalia of *Pseudouranotaenia rowlandii*. Theobald.

I cannot be certain of the structure of the mid ungues of the male, the large curved one is very marked but a second claw cannot be detected.

Genus **ANISOCHELEOMYIA.** Theobald.

The Entomologist, Vol. XXXVIII., p. 52 (1905).

Head clothed with flat scales rather loosely applied to the surface, and which form a more or less projecting mass between the eyes in front. Antennae densely pilose in the male. Proboscis swollen apically. Palpi very short in both sexes.

Thorax with narrow-curved scales in the middle, and with broad spindle-shaped ones around the front and sides; scutellum with small flat scales rather loosely applied, very distinctly trilobed.

Wings ornamented. Ungues of male not very unequal in length, but differing in breadth, one on each leg broad and leaf-like. Fork-cells short as in *Uranotaenia*.

Closely related to *Uranotaenia*, but differing in the non-plumose male antennae and peculiar ungues, also in the absence

of flat thoracic scales and more rugged appearance of the head and scutellum.

The genitalia cannot be made out, but the perfect specimens are evidently all three males.

The ungues are the most marked characters, and can only be seen by breaking up the specimens. The four species are closely connected by squamose characters as well as by the quaint ungues.

Although the ungues are unequal as in all male *Culicids*, they are not very unequal in length, but are in breadth and differ in form.

As no male genitalia can be detected, one can only assume they are all males from the unequal ungues. A female sent was so damaged in the post it could not be described, but the antennae are seen to be less pilose than in the male.

ANISOCHELEOMYIA NIVIPES. Theobald (1905).

The Entomologist, Vol. XXXVIII., p. 53 (1905).

Head creamy-white. Thorax rich brown in the middle, creamy-white around the dark area; pleurae creamy-white. Abdomen deep brown, with apical white bands. Legs deep brown, with pale reflections apically, last two hind tarsals white. Wings ornamented; costa dark, veins pale scaled except for a dark area spreading across at the base of the fork-cells; a noticeable pale spot on the dark costal area not reaching the costa.

♂. Head brown, clothed with rather loosely applied creamy-white flat scales; the antennae deep brown, basal segment deep reddish-brown; clypeus brown; palpi clothed with deep brown scales and with a few long black chaetae; proboscis deep brown with bronzy reflections swollen apically, hairy.

Thorax bright brown; the middle of the mesothorax with narrow-curved bronzy-brown scales and three rows of black chaetae, the dark scaled area surrounded by thicker creamy-white curved scales, forming a well contrasted whitish area, which is indented into the dark area on each side in front before the base of the wings; scutellum with small flat dark brown scales and black border-bristles, four to the mid lobe; metanotum bright chestnut-brown; pleurae clothed with dense creamy-white scales continuous with the pale areas around the mesothorax.

Abdomen deep brown, with deep brown scales and creamy-white scaled apical borders; the apical segment all pale scaled;

border-bristles pale. Legs deep brown; coxae and trochanters pale, last two and apex of the antepenultimate hind tarsals white; the fore and mid tarsals pale beneath; ungues unequal in size, but the posterior of nearly equal length, the larger fore and mid very broad and thick, the smaller abruptly curved basally. Wings ornamented; costa black and spiny; first long vein black-scaled with a large white area over the cross-veins, and a white apex; a dark area on the stem of the first sub-marginal cell and a small dark area beneath it on the third, most of the stem of the second fork-cell dark, also a dark area in the middle of the upper branch of the fifth and at the apex of the lower branch; the whole forming a dusky band across the otherwise pale-scaled wing; first sub-marginal cell about two-thirds the size of the second posterior cell, its stem twice as long as the cell; stem of the second posterior slightly longer than the cell; posterior cross-vein longer than the mid cross-vein, and nearly twice its own length distant from it, situated close to the base of the upper branch of the fifth vein. Lateral scales on the fork-cells and the third long vein large and lanceolate, a few very similar ones on the apex of the upper branch of the fifth; median vein scales small and dark on the fork-cells, third vein and middle of the upper branch of the fifth and the apex of the lower branch; those on the stem of the first fork-cell dark and some of almost *Etorleptiomyian*-form (i.e. heart-shaped), but more elongate.

Halteres with pale testaceous stem and fuscous knob.

Length.—2·5 mm.

Habitat.—Queensland (Dr. Bancroft).

Observations.—Described from two perfect specimens. Dr. Bancroft bred them and states that they live in company with *Uranotaenia pygmaea*, Theobald. Although very distinct they cannot be told from *U. pygmaea* until boxed. This species differs from all other related *Aedinae*, except the next three described here, in having distinctly ornamented wings. The thoracic ornamentation is also very marked, the indent of white scales into the dark area of the mesonotum in front being very characteristic, and the general sharply defined light and dark areas of the mesothorax make it very inconspicuous. The tarsi show paleness on all the legs in certain lights, and all are evidently pale beneath, but the hind legs only have the last two segments creamy white above.

ANISOCHELEOMYIA ALBOANNULATA. Theobald (1905).

The Entomologist, Vol. XXXVIII., p. 54 (1905).

Head black, with a narrow white line around the eyes with very long white projecting scales in front between them; proboscis black with a white patch above near the apex and another large white patch near the base.

Thorax deep brown, with a narrow silvery white line around the end of the mesonotum up to the base of the wings, and another more irregular one on the brown pleurae.

Abdomen black and snow white, ornamented with median white areas and white segments. Legs black, the hind pair with broad apical white bands, and the last two segments white; femora of all with white spots.

Wings ornamented, costal border black, veins white-scaled with two broad dusky bands running across them.

♂. Head black, clothed with small flat black scales, and a border of similar white ones around the eyes, which show pale blue reflections in certain lights under the two-third power, in front between the eyes projects a tuft of very long white scales, there are also scattered small upright black forked scales and a small basal median blue patch; antennae deep brown, basal segment black, base of second segment reddish brown; palpi very small, black-scaled; proboscis black, a large silvery-white patch towards the base, and a smaller one on the dorsum nearer the apex.

Thorax deep brown, with narrow-curved bronzy scales, a narrow white border around the front and sides of the mesonotum composed of broad curved scales, which appear pale blue in certain lights, ending about the roots of the wings; scutellum deep brown, clothed with small flat deep brown scales, very distinctly trilobed, the mid lobe large with four border-bristles; chaetae of mesothorax and scutellum black; metanotum black; pleurae brown, with a narrow wavy white-scaled line running along it from the base of the abdomen to the head, and a few white puncta near the base of the legs.

Abdomen black and silvery-white, the first segment mostly white-scaled, the second and third with a white median patch, the fourth all white, the fifth black with a few apical white scales, the sixth all white, the apical one black and white.

Fore legs deep brown with a spot at the apex of the femora, and a trace at the apex of the tibiae; mid legs with two white

femoral spots and silvery-white scaled beneath; hind legs with femoral spots more pronounced; tibiae with broad white median and apical bands; the tarsal segments with broad white apical bands except the last two hind tarsals which are all white; ungues unequal, one on each fore and mid leg very broad and curved, a thin web-like membrane between the curved outer portion; posterior ones not examined.

Wings ornamented with black and white scales much as in the former species, but there are two dusky areas across the surface. The stem of the second long vein close to the first, almost fused with it; stem of the first posterior cell nearly three



Fig. 267.
Wing of *Anisocheleomyia alboannulata*. ♂. Theobald.

times as long as the cell; stem of the second not quite twice as long; scales on the stem of the fourth rather long and broad longer than in the former species, posterior cross-vein longer than the mid, about one and a half times its own length distant from it. Black scales on the stem of the first fork-cell, on the basal half of the third, some on the base of the stem of the second fork-cell, on the greater part of the upper branch of the fifth, a few at the apex of the lower branch, and a batch near the base, also some near the base of the fourth.

Halteres with testaceous stem and fuscous knob.

Length.—2·5 mm.

Habitat.—India (Capt. James, I.M.S.).

Observations. Described from a single specimen. The species is a very beautiful and marked one, and cannot be confused with any other mosquito.

The structure of the ungues is very peculiar. The fore leg was removed from the type to show by microscopic examination the ungues, which seem to be exactly the same as those of the mid leg.

Type in the British Museum Collection.

ANISOCHELEOMYIA LEUCOPTERA. n. sp.

Head deep brown with flat dark scales with violet reflections, pale at the sides; thorax brown with a line of silvery white flattish scales outstanding on each side. Abdomen brown, ornamented with white scales on the first to fourth and apical segments, the scales mainly apical. Legs brown unbanded. Wings white scaled except for a dark brown area on the basal part of the costa, and ending in a brown patch over the cross-veins, where the membrane is also tinged with brown.

♂. Head deep brown clothed with flat dark scales with deep violet reflections, some paler flat scales at the sides; antennae pilose, brown; proboscis deep brown.

Thorax (partly denuded) brown with a line of flat outstanding silvery white scales on each side of the mesothorax in front of the wings; the middle with narrow-curved bronzy scales; scutellum brown with traces of small flat brown scales; pleurae grey and brown with patches of flat grey to pale blue scales; metanotum deep brown.

Abdomen deep brown, the first to fourth segments with white scales, mainly on the apical areas of the segments but on the second extending to the base, white scales also on the apical segment; posterior border-bristles brown.

Legs deep brown with bronzy reflections, ungues of the fore and mid legs not so very unequal in length, but in breadth, the fore pair curved almost at right angles, one broader than the other; the mid more unequal, the largest broad and curved, the smaller with two blunt teeth, one basal.

Wings with white scales to the veins, except the basal two-thirds of the costa, some on the sub-costal and first long vein and the second at the region of the cross-veins and towards the base of the second, just above the cross-veins where the dark scales are collected the wing membrane is tinged with brown, this making a well contrasted dark area on the white wing field; the first sub-marginal cell slightly smaller than the second posterior cell, its stem two and a third times the length of the cell; stem of the second posterior, one and a-half times the length of the cell; supernumerary vein thick, brown, meeting the narrow mid vein, the posterior much longer than the mid, arising from near the base of the upper branch of the fifth; sloping backwards and about its own length distant from the mid; the lateral vein-scales are large and lanceolate, the median small and spatulate;

at the base of the fourth and fifth are large flat white scales, forming a long line on the fifth, a short basal one on the fourth; and some on the base of the sixth; the fifth vein is thickened; halteres with pale stem and fuscous knob.

Length.—3 mm.

Habitat.—Stanley Town, New Amsterdam, British Guiana (Dr. Rowland).

Time of capture.—August.

Observations.—Described from a damaged male, but as it is so very marked it has been described. The white scaled wings with the deep brown area on the upper basal part at once separates it from all other American and West Indian species.

ANISOCHELEOMYIA (?) ALBITARSIS. Ludlow (1905).

Canad. Ento. XXXVII., p. 131 (1905).

"♀. Head brown, covered with very large, long, flat scales, so loosely applied as to make the head look shaggy, a wide median white stripe extending from occiput to vertex, a few white scales and two brown bristles projecting forward between the eyes, a narrow white line around the eyes, the scales long and flat and projecting forward over the eyes, also some brown bristles; lateral to this broad median stripe is a broad, brown stripe, a narrow white stripe, a narrow brown and another narrow white stripe, all of the long flat loosely set flat scales. Antennae brown, verticels and pubescence brown, first segment short and somewhat distended, and clothed with a few flat brown scales, basal segment brown, heavily scaled with rather large, flat, loosely applied white scales; palpi brown with white tips, the scales being unusually long and square ended; proboscis brown scaled; clypeus brown; eyes brown; the shaggy appearance of the head makes them seem extremely small, so that instead of being the larger part of the head they are quite insignificant.

Thorax dark brown; prothoracic lobes covered with large white flat scales, much like those on the head, and some brown bristles; mesonotum brown, covered with brown and white curved scales, those on the cephalic and median parts very slender, almost hair-like, those at the sides and towards the scutellum broader, a narrow line of white scales running cephalad from one wing joint to the other (an inverted U), a median line connecting with it at the cephalad end and extending to the scutellum, two short lines from the scutellum cephalad; pleurae brown, with heavy bunches of broad long flat white scales arranged in rows; scutellum brown, deeply trilobed with large long flat scales closely set on each lobe so that they appear tufted; metanotum rich brown, bare.

Abdomen brown, covered with brown scales, and narrow white basal bands on most of the segments, lacking on the first and last three segments, which latter, however, have narrow lateral white spots, the continuation of the ventral marking. The ventral marking is very

peculiar, the proximal segments being mostly white scaled, with only narrow brown apical bands, but the last three segments are largely brown scaled, a narrow white line starting at the median line of the base of the antepenultimate, running sharply lateral and then caudal, forming the lateral white spots of the three last segments noted above; apical brown hairs, apparently much more numerous on the antepenultimate segment.

Legs all brown, with more or less white at the bases; coxae and trochanters testaceous with white scales; fore femora dark brown, a narrow white line on the ventral side extending from the base to near the apex, where there is a white spot on ventral and lateral aspect, not appearing on the dorsal aspect; tibiae brown, a very narrow white band a little proximal of the middle or the cephalic aspect; first and second tarsal segments basally light banded, second, third and fourth segments brown; mid femora light at the base, a distinct white spot about midway, and an indistinct white spot interior to this, both on the cephalic aspect, also a brilliant white spot at the apex; tibiae brown, with a white band about midway, first and second tarsal segments have white basal bands, rest of tarsals brown; hind femora brown, white at base and nearly two-thirds its length and apex white (femora therefore mostly white); tibiae brown, with median white band; first, second and third tarsal segments with heavy white basal bands, last two segments pure white. Ungues on fore and mid legs, though equal and simple, are much heavier than are usually found in any mosquito of this size, the hind ones markedly smaller.

Wings clear, brown scaled, scales very large, and of *Taeniorhynchus* type, but a little inclined to asymmetry; cells short; first sub-marginal cell nearly a half longer and a little narrower than the second posterior cell, stem of the former about one-third shorter than that of the latter; supernumerary and mid cross-veins also about the same length, and distant from the mid a little more than twice its own length; halteres with light stem and dark knob.

Length.—2·5 mm.

Habitat.—Camp Stotsenberg, Angeles (Miss Ludlow)."

Genus **FICALBIA.** Theobald.

Mono. Culicid. III., p. 296 (1903); Gen. Ins. Fam. Culicid., p. 36 (1905), Theobald.

Three species are now known in this genus :—

Abdomen banded.		
Legs unbanded	*nigripes.*	Theobald.
Legs banded	*minima.*	Theobald.
Abdomen banded	*simplex.*	Theobald.

So far all three species are represented by males.

FICALBIA NIGRIPES. Theobald (1905).

Annals and Magazine of Natural History, Ser. 7, Vol. XV., February 1905, p. 199.

Head black. Thorax pale bright yellowish-brown, with two parallel dark lines behind. Abdomen deep brown, with narrow pale basal bands. Legs, antennae, palpi and proboscis deep blackish-brown. Wings with pale scaled veins and with deep brown costa.

♂. Head clothed with flat deep black scales and black upright forked scales. Antennae deep blackish-brown, with paler dusky bands and deep brown plume-hairs Proboscis deep blackish-brown, swollen apically; palpi small; deep brown.

Thorax pale brown, clothed with long narrow-curved pale dull yellowish scales, except for two paralled bare lines, and with two broad lines of long narrow-curved black scales on each side of the bare space in front of the scutellum and extending past it; two rows of long black bristles and numerous black ones over the roots of the wings; scutellum clothed with flat black scales and with brown border-bristles; metanotum deep brown; pleurae pale ochreous.

Abdomen deep blackish brown, with white basal bands and brown lateral hairs.

Legs deep blackish brown; the coxae pale ochreous.

Wings with brown scales; fork-cells short, of nearly equal length; base of the first sub-marginal cell nearer the apex of the wing than that of the second posterior, its stem about one and a half times the length of the cell; stem of the second posterior not quite one and a half times the length of the cell; posterior cross-vein sloping backwards, not quite its own length distant from the mid vein; median vein-scales in single line; lateral vein scales large and bluntly lanceolate, existing on the second, third, and branches of the fourth veins only, narrower ones on part of the first long vein, those on the first and subcostal short and spatulate, like those forming the median vein-scales, only in two rows; costa with an inner row of short spatulate scales, and the outer border with deep brown spiney ones; the sixth vein is much curved apically.

Length.—2·8 mm.

Time of appearance.—December.

Habitat.—Kortright, Freetown, Sierra Leone, 1200 feet (Major F. Smith, D.S.O., R.A.M.C.).

Observations.—Described from a perfect male. The specimen was bred by Major Smith from a larva taken in a hole in a brook.

This is the first *Ficalbia* that has occurred in Africa. The only other species with banded abdomen is *F. minima*, Theobald, from South India, but the Indian species has banded legs.

Genus **HODGESIA.** Theobald.

Journ. Trop. Med., January 15 (1904); Gen. Ins. Fam. Culicid., p. 40 (1905).

Head clothed with small flat scales, rather rounded apically and loosely applied to the surface; palpi very small, apparently one-jointed, covered with scales; antennae with large globular basal segment, of 13 segments, long bristles at the nodes, short along the internodes; proboscis not quite as long as the whole body; clypeus normal. Thorax with the prothoracic lobes covered with flat scales; mesonotum with large, long, narrow-curved scales; scutellum with small flat scales similar to the head; abdomen with flat scales, arranged ventrally so as to form slightly projecting tufts.

Legs long, especially the hind pair; apices of the femora and tibiae rather dilated; fore femora slightly swollen; ungues equal and simple in the ♀.

Wings with normal Culicine venation, but the third long vein is carried past the marginal cross-vein as a scaled vein; the lateral vein-scales long and nearly overlapping those of contiguous veins, *their apices with marked lateral spines.*

Male unknown.

This genus presents superficial resemblances to *Stegomyia* and others, but can at once be told by the very marked structure of the lateral vein scales.

Judging from the palpi, if their characters are any index, this genus should come in the *Aedinae.*

Hodgesia sanguinae. Theobald (1904).

Journ. Trop. Med., January 15, 1904.

♀. Head black with a median silvery-white area, the scales as mentioned in the generic description; black bristles project over the eyes; antennae with very large black basal segment; remainder

black with slightly paler nodes, verticillate and internode hairs black; clypeus black; proboscis black scaled.

Thorax shiny black; prothoracic lobes with flat silvery-white scales; mesonotum with very long bronzy-black narrow-curved scales; scutellum black with small flat black scales and with black border-bristles; metanotum shiny black; pleurae black with at least one spot of silvery-white scales.

Abdomen black scaled with five lateral silvery-white spots, the three apical ones very prominent, the two more basal ones rather indistinct; these spots are more apical than basal and the scales of the apical three apparently stand out from the surface of the body.

Legs black except the bases, which are testaceous, and two silvery spots on the coxae; apices of femora and tibiae slightly dilated owing to numerous scales; the fore femora are somewhat dilated.

Wings with brown scales, the median of all the veins broad and spatulate, those of the sub-costal, first long vein and also the second except the lower branch double, the rest single; the lateral vein-scales long and either touching or overlapping, with distinct lateral spines; border-scales clavate; fringe long, scales of three series; first sub-marginal cell longer and wider than the second posterior cell, its base slightly nearer the base of the wing, its stem rather more than half the length of the cell; stem of the second posterior as long as the cell; the mid cross-vein and the supernumerary not meeting, the former nearer the apex of the wing, at a slightly acute angle to one another; posterior cross-vein nearly twice its own length distant from the mid; the second long vein carried past the marginal cross-vein and scaled past it; a very pronounced pseudo-vein between the fifth and the sixth.

Halteres with the testaceous stem, the knob dark, the stem prominently elbowed at the base.

Length.—2 mm.

Time of appearance.—June and October.

Habitat.—Entebbe.

Observations.—A series of four females sent by Dr. Aubrey Hodges. They are very distinct and can at once be told by the curious wing scales. No other species occurs in the genus, so that no comparison is needed. Dr. Hodges writes me that he has not seen it elsewhere than at Entebbe, and that it is extremely difficult to capture undamaged, and that it is a blood-

sucker. Dr. Hodges writes that although he had not examined it microscopically, he suspected it to be either a *Stegomyia* or an *Uranotaenia*, and pointed out that the silvery spots on the under-side (not venter) of the abdominal segments, together with those on the head and thorax, were characteristic of a new species, and such soon proved to be the case.

Genus **MIMOMYIA.** Theobald.

Mono. Culicid. III., p. 304 (1903); Gen. Ins., Fam. Culicid. p. (1905); First Rept. Gord. Coll. Khart., p. 79 (1905); Theobald.

The female only has so far been described, and in general appearance it resembles an *Uranotaenia* but the larger fork-cells and narrow-curved scutellar scales will at once separate it.

Dr. Balfour has recently sent a male which is described here, I feel sure it is the male of the new species recorded. It is one of the most curious mosquitoes seen. The proboscis is much swollen for half its length, the labella small, leaf-like and acuminate, and the palpi long and thin and acuminate, about two-thirds the length of the proboscis. The structure of the palpi would thus place it between the *Culicinae* and *Aedinae*.

Mimomyia uniformis. Theobald.

First Rept. Gord. Coll. Well. Labs., p. 79 (1905).

Head brown with yellowish scales, thorax testaceous with small black scales. Abdomen brown with blackish-brown scales, the apical segments with scattered creamy scales. Legs uniformly brown, femora pale beneath. Wings with a pale spot at their base.

♀. Head brown, clothed with rather irregular flat creamy scales and some yellow and black upright-forked ones, the latter towards the nape; antennae brown, basal segment testaceous darker on the inside, remainder deep brown; proboscis brown, swollen apically and the labellae black; palpi small, testaceous, with black scales above.

Thorax shiny brown with scattered narrow-curved black scales; pleurae testaceous; scutellum bright brown with black narrow-curved scales, four border-bristles to the mid lobe; metanotum chestnut-brown with brown scales and with basal bands

of dull creamy scales, so dull that they are only noticeable in certain lights; apical segments with a few scattered creamy scales; border-bristles dull golden.

Legs uniformly brown, except the under side of femora, which are pale; in certain lights the legs show ochreous reflections. Wings with brown scales and with a nude shiny white basal patch, lateral scales on the apical portions of the veins and on the major area of the second and on one side of the fourth elongate, clavate, those on the basal parts of the second and fourth longer than the others; median vein-scales short and spatulate, a single row only, those on the sixth somewhat longer than the rest; first sub-marginal cell about the same length and scarcely narrower than the second posterior cell, its base nearer the apex of the wing, its stem longer than the cell; stem of the second posterior about the length of the cell; supernumerary cross-vein slightly nearer the base of the wing than the mid cross-vein; posterior cross-vein longer than the mid and about its own length distant from it; halteres with grey stem and black scaled knob.

Length.—2 mm.

♂. Proboscis brown, swollen from a little past the middle ventrally, apex truncated, labellae leaf-like and acuminate, clothed with small brown scales. Palpi very thin and needle-like, about two-thirds the length of the proboscis, swollen at the base and clothed with small brown scales. Antennae densely plumose, plume-hairs brown.

Legs brown, unbanded; fore and mid ungues simple, unequal; hind, small, equal and simple. Wings with similar scales to the female, but the lateral clavate ones rather shorter and broader; the upper branch of the first sub-marginal cell rather close to the first long vein; first sub-marginal cell scarcely narrower but almost the same length as the second posterior cell, its stem as long as, or longer than the cell, its base nearer the apex of the wing than that of the second posterior cell, stem of the latter as long as the cell; posterior cross-vein longer than the mid and about its own length distant from it, supernumerary and mid cross-veins united. Upper costal border with black spines.

Length.—2 mm.

Habitat.—Lado (female); Bahr-El-Jebel (male) (Dr. A. Balfour); Congo Free State (Drs. Dutton and Todd).

Observations.—Described from a single female and male. It

can at once be told from the two other African *Mimomyias* by the general brown hue. The female was partly denuded in transit, but some notes sent by Dr. Balfour completed the description. Mr. Newstead has given me a ♂ and ♀ from a series collected by Drs. Dutton and Todd in the Congo Free State. They differ slightly in regard to the relative lengths of the fork-cells and their stems, the latter being relatively shorter than in the type. The length of the ♂ palpi also varies, some being no more than half the length of the swollen proboscis.

MIMOMYIA SPLENDENS. Theobald (1903).

Mono. Culicid. III., p. 304 (1903); First Rept. Gord. Coll. Well. Labs., p. 81 (1905).

Dr. Balfour records this very marked species from the Sudd country, Bahr-El-Jebel; the specimen being captured on the steamer. He has not sent me the specimen, but says apart from the features mentioned below, it entirely agrees with the type, having apple-green scales on the thorax, etc.

The following differences are pointed out: —"The halteres of a fine lemon yellow; there is a thick scaling, almost tufting, at the apices of the tibiae with metallic violet scales and metallic violet scales are scattered over the tibiae and some on the coxae." These differences in colour are due probably to Dr. Balfour noting a fresh specimen, whilst mine was some months old. The only important character is the trace of tibial tufting, but if only slight it cannot be taken as a character sufficient to separate the specimen as a new species.

METANOTOTRICHAE-HETEROPALPAE.

(Metanotum with hairs or chaetae.)

HETEROPALPAE.

(*Palpi short in* ♀, *long in* ♂.)

The following (p. 584) is Lutz's grouping; his first sub-family (*Hyloconopinae*) is the same as my sub-family *Trichoprosoponinae*, and the *Dendromyinae* of Lutz and the *Sabettinae* of Blanchard are also synonymous.

Sub-family Hyloconopinae.

Palpi of ♀ scarcely one-third length of proboscis; of ♂ nearly same length.
A conical blunt prominence between eyes and clypeus *Runchomyia.* Theobald.
Conical prominence missing.
Proboscis very long with pointed apex.
Proboscis does not exceed length of abdomen and has the apex swollen *Hyloconops.* Lutz.
Clypeus with hairs *Trichoprosopon.* Theobald.
Clypeus without hairs *Joblotia.* Blanchard.
Metanotum with scales.
Proboscis short, expanded apically *Goeldia.* Theobald.

ISOMICROPALPAE.

(Palpi short in both sexes.)

Sub-family Dendromyinae.

1. Middle of the legs with some of the scales elongated laterally and formed into paddle-like structures *Sabethes.* R. Desvoidy.
2. Legs without paddle-like structures.
3. Lateral vein-scales linear. 4–5.
 Lateral vein-scales obovate or spatulate, not always symmetrical. 6–9.
4. Proboscis longer than body *Phoniomyia.* Theobald.
5. Proboscis swollen at apex, shorter than body *Wyeomyia.* Theobald.
6. Proboscis fine at apex, same length as abdomen.
 Posterior and mid cross-vein in one line, brilliant *Sabethoides.* Theobald.
 Proboscis short, with apex swollen.
 Supernumerary cross-vein slightly nearer base than mid.
7. Scales on mesonotum dusky metallic ... *Dendromyia.* Theobald.
 Scales of mesonotum very brilliant.
 Metathorax with scales.
 Proboscis same in both sexes *Sabethinus.* Lutz.

Sub-Family **TRICHOPROSOPONINAE.**

THEOBALD.

(*Hyloconopinae*, Lutz; *Joblotinae*, Blanchard.)

Genus **RUNCHOMYIA.** Theobald.

BINOTIA. Blanchard.

Mono. Culicid. III., p. 319 (1903), Theobald; Archiv. de Parasitologie VIII., p. 478 (1904), Blanchard; Les Moust., p. 427 (1905), Blanchard; Gen. Ins., p. 38 (1905), Theobald.

Blanchard renamed this genus, *Binotia*, because of Robineau-Desvoidy's genus *Rhynchomyia* (1830). The two names are quite distinct and hence the original name for this genus has been retained by Lutz and others.

RUNCHOMYIA FRONTOSA. Theobald (1903).

Binotia frontosa. Blanchard.

Mono. Culicid. III., p. 319 (1903); Les Moust., p. 427 (1905), Blanchard.

♂. Head clothed with flat silvery-grey scales, dusky brown behind and at the sides with dull pale bluish reflections, and in some lights violet, ochreous behind with a row of dark forked scales and black chaetae in front. Palpi longer than in ♀, ochreous with brown scales, with violet reflections and numerous brown bristles, dense at the apex; proboscis deep brown with violet and bronzy hues as long as the whole body; antennae brown, basal segment bright testaceous, verticillate hairs longer than in the ♀ and rather denser, but nothing like plumose; frontal process pale ochreous with a very small median rather darker process.

Thorax as in the ♀, but the flat scales at the sides in front are more pronounced.* Scutellum paler, almost ochreous; metanotum dark with weaker chaetae.

Abdomen as in the ♀, that is unbanded, blackish with violet reflections with lateral yellow spots to some extent median but extending more or less the whole length of the segments, curved

* This character was omitted in Vol. III., p. 329. The sides of the mesothorax in front in the ♀ have small flat pale scales forming a distinct mass.

towards the centre, somewhat shiny and metallic; venter pale creamy yellow.

Legs brown with metallic reflections; tibiae with spine; fore ungues very slightly unequal, simple, also the mid.

Wings with long fork-cells, the first sub-marginal longer and narrower than the second posterior cell, its stem less than one-half the length of the cell; stem of the second posterior about two-thirds the length of the cell, base of the first sub-marginal cell slightly nearer the base of the wing than that of the second posterior; posterior cross-vein longer than the mid, very slightly nearer the base; scales as in the ♀.

Length.—6·5 mm.

Habitat.—Mana, Brazil (Dr. Fajardo).

Time of capture.—April.

Observations.—Described from a perfect ♂ sent with a ♀. The male has not previously been described.

Previous specimens have been sent (Vol. III.) from British Guiana. The frontal process of the ♂ is not so pronounced as in the ♀.

Genus **HYLOCONOPS.** Lutz.

Mosquitos do Brasil, pp. 49 and 55 (1904).

Head with flat scales; proboscis swollen at the apex, not longer than the body; palpi short in the ♀, as long as the proboscis in the ♂; antennae plumose in ♂; pilose in ♀.

Thorax with long narrow-curved scales over most of the surface, with a large lateral patch in front of closely appressed flat scales, and some irregularly placed larger flat scales just in front of the scutellum, which is clothed with flat spatulate scales; pleurae completely clothed with closely appressed small flat scales; metanotum with chaetae and squamae. Wings with rather large scales.

This genus has, like *Trichoprosopon*, the curious patch of flat closely appressed scales on each side of the thorax in front and the densely armoured pleurae. It seems to me to resemble it very closely, but the swollen apex of the proboscis and the shorter ♂ palpi will separate it. In any case it is very close to *Trichoprosopon*. Lutz describes one species, ***Hyloconops pallidiventer***, and has given me another, which he called ***longipalpis***, and a third he sent me in a previous lot.

HYLOCONOPS PALLIDIVENTER. Lutz (1904).

Mosquitos do Brasil, p. 49 (1904), Lutz (in Bourroul).

Head black; palpi and proboscis black. Thorax dark brown, ochreous in front and at the pleurae, with a darker median area on the latter, a small line of silvery white scales on each side of the mesonotum in front, and white scales on the prothoracic lobes and white punctae on the pleurae. Abdomen dusky metallic deep blue, with apical lateral silvery spots. Legs unbanded, deep metallic bronze and violet; femora beneath and base of tibiae pale.

♀. Head clothed with flat scales showing violet in some lights, dull violet and brown in other lights; two brown chaetae projecting forwards between the eyes; the proboscis and palpi black, the latter with metallic hues, the former rather swollen apically and golden ventrally at the apex, violet in some lights; antennae deep brown with some dusky scales on the second and third segments.

Thorax brown with narrow-curved dusky brown scales, a patch of flat scales on each side in front, mostly dusky, but the upper edge pale showing as a white line with a lens; prothoracic lobes ochreous with flat dusky and apical silvery white scales; the posterior part of the mesonotum with some flat azure blue scales near the scutellum, and the scutellum with similar flat azure blue scales; metanotum brown with flat creamy scales and brown chaetae; pleurae entirely clothed with dense armour of brown, ochreous and white flat scales.

Abdomen dull metallic violet blue with apical white spots; in some lights it will show deep green or blue.

Legs deep brown with metallic violet and bronze reflections.

Wings with the first sub-marginal cell much longer and narrower than the second posterior cell, its base much nearer the

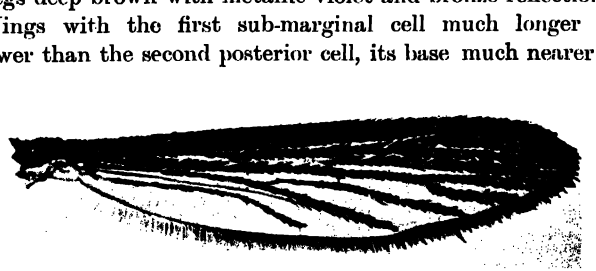


Fig. 268.
Wing of *Hyloconops pallidiventer*. ♀. Lutz.

base of the wing than that of the second posterior cell, its stem not quite one-third the length of the cell; stem of the second posterior as long as the cell; posterior cross-vein longer than the mid and in front of it, the supernumerary also in front of the mid; the third long vein passing into the basal cell as a scaled vein.

Length.—6 mm.

♂. Palpi nearly nude as long as the proboscis, acuminate; antennae brown, plumose, with pale internodes. Flat scales on metanotum violet, not creamy as in the ♀. Abdomen similar, but the lateral spots pale golden. Fore and mid ungues unequal, simple, the larger bent in at the middle, hind equal and simple, small.

Length.—6 mm.

Habitat.—São Paulo, Brazil (Dr. Lutz).

Observations.—Redescribed from a ♂ and ♀ named by Dr. Lutz. It is closely related to the next species, but can be told by the deep metallic blue abdomen and the paler lateral spots.

HYLOCONOPS LONGIPALPIS. Lutz MS.

Head black, also palpi and proboscis, which is curved upwards. Thorax bright brown, yellowish at sides with silver scaled patches. Abdomen metallic violet to coppery red, with lateral apical golden patches and golden venter. Legs unbanded with metallic violet, purple and coppery hues.

♀. Head clothed with flat scales with a distinct median parting, dark behind, violet on each side in front, a few paler ones in the middle anteriorly; black upright forked scales; palpi and proboscis black, the former with various metallic scales of varied hue, the latter with a few at the base; the proboscis curved upwards; antennae black, with long black verticillate hairs and pale pubescence on the internodes.

Thorax bright brown or black, according to the light, with long narrow-curved deep brown scales, except on each side in front, where there is a patch of closely appressed flat spatulate golden, creamy and mauve ones, in some lights the ventral ones are brown; there are also a few flat azure blue and green scales just before the scutellum, forming more or less of a line; prothoracic lobes with small dull flat scales and black chaetae; scutellum with flat azure blue and peacock green flat scales, appearing brown in some lights; posterior border-bristles of the mid lobe deep brown, seven in number, metanotum deep brown

and shiny, with traces of median ochraceous lines in some lights, and deep brown chaetae near the middle of the apex; pleurae ochreous, with a few patches of flat silvery white scales.

Abdomen brilliant metallic violet, with apical golden patches and pale golden scaled venter; the apical patches show dorsally on the penultimate and ante-penultimate segments.

Legs metallic violet, unbanded, in some lights coppery; ungues equal and simple.

Wings with the first sub-marginal cell much longer and slightly narrower than the second posterior cell, its base nearer



Fig. 269.
Wing of *Hyloconops longipalpis*. ♀. Lutz.

the base of the wing than that of the second posterior cell, its stem less than one-fourth the length of the cell; stem of the second posterior cell nearly two-thirds the length of the cell; supernumerary and mid cross-veins in one line, the posterior longer than the mid, a little nearer the base of the wing, the third long vein passes into the basal cell as a scaled vein.

Length.—5·5 to 6 mm.

♂. Head clothed with flat bright blue scales and black upright forked scales, the blue shade changes to brown in certain lights. Antennae densely plumose, brown, the basal segment large, bright yellow with small black chaetae; proboscis deep brown with purple, violet and coppery reflections; palpi thin, acuminate, about the same length as the proboscis and the same colour, last two segments about equal in length, a few terminal bristles.

The patch of flat scales on the side of the thorax showing mauve, coppery and dull orange colours. Legs of a brilliant coppery red hue in some lights, brown in others; fore and mid ungues unequal, simple; hind equal and simple.

In the wings the supernumerary and mid cross-veins are not in one line but meet at an angle, otherwise the same.

Length.—6 mm.

Habitat.—Brazil (Dr. Lutz).

Observations.—These specimens were given me named by Dr. Lutz. I am not aware if he has described them. It comes very near *H. pallidiventer*, but the abdomen is of a brilliant metallic purple and violet, the lateral spots are more golden, and the ♀ palpi are longer than in that species.

Genus **TRICHOPROSOPON.** Theobald (1901).

Joblotia. Blanchard (1901).

Mono. Culicid. II., p. 283 (1901), Theobald; C. r. Soc. Biol. 53, p. 1843 (1901), Blanchard; Gen. Ins. Fam. Culicid., p. 33 (1905), Theobald; Tec. Se. 11, U.S. Dept. Agri. Div. Ent., p. 27 (1906), Coquillett.

The hairy clypeus is a very marked character, and will at once separate this genus. The densely appressed small flat scales on each side of the front of the mesonotum, and the complete armour of similar scales on the pleurae are also very characteristic, but occur in other Culicids, such as in the closely allied genus *Hyloconops* of Lutz.

Blanchard abolished the name *Trichoprosopon* because Macquart used the name *Trichoprosopus* in 1843. Owing to the different termination the name has been retained by Coquillett, Lutz, Felt and others.

Trichoprosopon compressum. n. sp. Lutz.

Head silvery white in front, dark brown behind; thorax deep brown, ochreous in front and at the sides; pleurae pale with silvery scales; abdomen deep metallic green with creamy apical lateral spots and creamy venter. Legs deep brown with purple reflections, the last two tarsals of hind legs pure white, in the mid legs the mid three tarsals are white.

♂. Head clothed with flat scales silvery white to pale blue in front, dark brown behind with a row of deep brown upright forked scales along the nape divided in the middle, two long dark bristles projecting forwards between the eyes; antennae plumose, brown; palpi thin, deep brown, acuminate, no plume hairs, the apical segment considerably shorter than the penulti-

mate; the palpi considerably shorter than the proboscis which is deep brown with metallic shades and is curved apically.

Thorax densely clothed with narrow-curved dusky black scales, which become spatulate just before the scutellum, a lateral patch on each side in front of small, flat, closely appressed scales silvery on the upper surface, ochreous and brown on the lower; prothoracic lobes ochreous with small flat dull brown, ochreous and silvery scales; scutellum with large flat brownish scales which appear blue in some lights; metanotum deep brown with chaetae near the apex and some median flat bronzy to creamy scales; pleurae ochreous brown densely clothed with small flat closely appressed brown, ochreous and silvery scales.

Abdomen steely blue and green with apical lateral pale creamy to golden patches and pale ventrally; the lateral spots show on the dorsum of the last few segments; the abdomen is compressed laterally at the base and expanded towards the apex.

Legs deep brown with metallic coppery and purple reflections, the fore legs unbanded, the mid with the second to fourth tarsals white, fifth black; hind legs with the last two and apex of the third pure white, fore ungues unequal, large, uniserrate, mid smaller, unequal and simple; hind small, equal and simple.

Wings with dense white scales, except on the lower branch of the fifth where one side is provided with long thin linear scales; fork-cells long, the first sub-marginal much longer and narrower than the second posterior cell, its base nearer the base



Fig. 270.
Wing of *Trichoprosopon compressum*. ♂. n. sp.

of the wing, its stem less than one-third the length of the cell; stem of the second posterior cell nearly as long as the cell; supernumerary and mid cross-veins close together, the posterior much longer than the mid and about one-third of its length distant nearer the apex of the wing. Genitalia with long claspers, straight nearly to the end and then curved with a very long

terminal dark spine-like segment; harpogones short, lamellate, rounded apically; setaceous lobes wide and far apart with a border of broad long setae.

Length.—6 mm.

♀. Head clothed with flat dull peacock blue scales with a patch of brown ones in the middle in front and brown ones behind, in some lights the blue scales appear rich deep violet with a single row of black upright forked scales behind and black bristles projecting forwards anteriorly; clypeus deep brown with dense brown hairs; proboscis blackish brown, stoutish and not expanded apically; palpi dark brown; antennae brown, tarsal segments pale on one side with black hairs.

Thorax as in the ♂.

Abdomen as in the male only browner in hue and flat and broad.

Legs as in the ♂ but the yellow band on the mid legs only includes the second and greater area of the third tarsal; ungues equal and simple.

Wings with large, dense brown scales, some narrower lateral ones on one side of the lower branch of the fifth vein as in the male, the sixth vein turned at right angles to the costa at its end; first sub-marginal cell considerably longer and a little



Fig. 271.
Wing of *Trichoprosopon compressum.* ♀. n. sp.

narrower than the second posterior cell, its base nearer the base of the wing, its stem about one-third the length of the cell; stem of the second posterior cell about two-thirds the length of the cell; the mid cross-vein a little in front of both the super-numerary and posterior, the latter much the longest.

Length.—7 mm.

Time of capture.—December, January, May.

Habitat.—Brazil.

Observations.—Redescribed from two ♂'s and one ♀ given me by Dr. Lutz.

It differs from others of this genus in the banding of the legs. In this respect the ♀ does not agree with the ♂, and I have very strong doubts as to its being the same species. The ♂ abdomen is strongly compressed laterally, the female is not. There is a great play of colours over the whole body, so that the banding of the legs had best be relied on to distinguish it.

TRICHOPROSOPON NIVIPES. Theobald (1901).

Joblotia nivipes. Theobald–Blanchard.

Mono. Culicid. II., p. 285 (1901), and III., p. 534 (1903), Theobald; Ann. Mus. Nat. Hung. III., p. 109 (1905), Theobald; Os Mosq. no. Para., p. 120 (1905), Goeldi.

Additional localities.—Mexico (Nat. Mus., Hung.); and various localities in Brazil (Drs. Goeldi and Lutz).

Life-history and habits.—Dr. Goeldi has figured the larvae from



Fig. 272.
Labial plate of *Trichoprosopon nivipes* (after Goeldi).

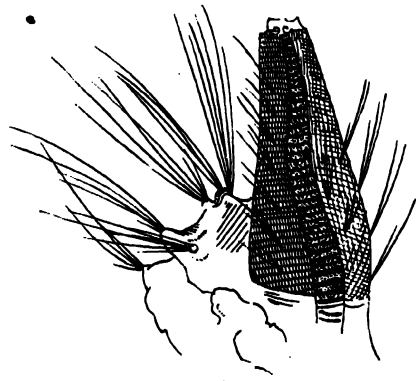


Fig. 273.
Siphon of *Trichoprosopon nivipes*. Theobald (after Goeldi).

fresh material. They were obtained from water between the leaves of bromelias and at the base of banana leaves.

The pupa shows very small terminal plates, and the two last segments bear large tufts of hairs (24–26 and 14–16 respectively).

GENUS **JOBLOTIA.** Blanchard–Lutz.

C. r. de la Soc. de Biol. LIII., p. 1045 (1901), Blanchard; Mosq. do Brasil, p. 6 (1904), Lutz.

This name has been adopted by Lutz for a separate genus to *Trichoprosopon*. It differs from the previous genus in that the clypeus is *not hairy*, otherwise it is the same.

So far a single species occurs in it, viz. :—

JOBLOTIA LUNATA. Theobald (1901).

Trichoprosopon lunata. Theobald.

Mono. Culicid. II., p. 279 (1901), and III., p. 336 (1903), Theobald; Les Moust., p. 429 (1905), Blanchard.

Additional locality.—Sandi, Brazil (Dr. Lutz), (19. 3. 05).

SUB-FAMILY **DENDROMYINAE.** Lutz.

SABETTINAE. Lutz.

GENUS **SABETHES.** Robineau-Desvoidy (1827).

SABETTUS. Scudder (nov. nom.) (1882).

Essai s. l. Tri. Culicides, p. 411 (1827), Robineau-Desvoidy; Brit. Mus. List. I., I. (1840), Walker; Dipt. Arg. XI., p. 66 (1891), Arribalzaga; Mono. Culicid. I., p. 247 (1901), II., p. 345 (1901), and III., p. 321 (1903), Theobald; Mosq. do. Brasil, p. 6 (1904), Lutz in Bourroul; Les Moust., p. 420 (1905), Blanchard; Gen. Ins. Fam. Culicid., p. 39 (1905), Theobald.

Blanchard has followed Scudder's new spelling of this genus. There is no reason, however, why Desvoidy's original name should not stand.

Five species are now known. They all come from South America.

The five known species are :—

Sabethes longipes, Fabricius, 1794 (Syst. Antl. IV., 400, 2, and Mono. Culicid. I., p. 250, 1901).

S. remipes, Wiedemann, 1828 (Auss. Zweiflug-Ins. I., p. 573, and Mono. Culicid. I., p. 248, 1901).

S. nitidus, Theobald, 1901 (Mono. Culicid. II., p. 347, and III., p. 326, 1903).
S. lutzii, Theobald (Mono. Culicid. III., p. 323, 1905).
S. albiprivatus, n. sp., Lutz.

SABETHES ALBIPRIVATUS. n. sp. Lutz.

Head metallic violet; proboscis black; palpi black with violet reflections. Thorax black, with metallic green and peacock-blue scales; prothoracic lobes with violet, mauve and golden-yellow flat scales. Abdomen blue and violet with golden lateral spots. Legs deep brown with violet reflections, the mid legs with a large deep brown paddle, none on the fore or hind.

♀. Head black, with flat deep brown and brilliant violet scales, showing according to the light; palpi and proboscis black, in some light showing brilliant violet and purple reflections; clypeus frosty-grey; antennae deep brown, with dark hairs to the nodes and pale pubescence between; basal segment frosty.

Thorax black, with brilliant peacock-blue and green flat scales, the latter prominent before the scutellum; the prothoracic lobes with larger flat brilliant violet scales at the base, golden ones at the front; scutellum with brilliant green and golden flat scales; metanotum deep brown; pleurae with dense silvery-white flat scales.

Abdomen with metallic blue, green, deep violet and purple scales, with basal lateral golden spots and golden scaled venter.

Legs deep violet and purple, the mid pair with deep rich brown paddles, the hind tibiae with rather expanded scales apically; ungues equal and simple.



Fig. 274.
Wing of *Sabethes albiprivatus*. ♀. Lutz.

Wings with typical scales, deep brown in colour showing violent iridescence; the first sub-marginal cell very much longer and narrower than the second posterior cell, its base nearer the

base of the wing, its stem less than one-third the length of the cell, stem of the second posterior two-thirds the length of the cell; mid cross-vein slightly in front of the supernumerary, the posterior much longer than the mid, in a line with it.

Length.—5·8 mm.

Habitat.—São Paulo and Rio de Janeiro, Brazil (Dr. Lutz).

Time of capture.—November.

Observations.—Described from two perfect ♀'s given by Dr. Lutz. It shows most varied and beautiful colouring of brilliant metallic hues, almost defying description owing to the varied play of colours. The mid legs only being paddled will, however, at once separate it from all but *S. remipes*. The thoracic blue and green colours instead of coppery-red and green and the abdomen having golden lateral spots instead of white in the ♀ also at once render its identification an easy matter.

Genus **WYEOMYIA.** Theobald.

Mono. Culicid. II., p. 267 (1901) and III., p. 310 (1903), Theobald; Gen. Ins. Fam. Culicid., p. 38 (1905), Theobald: Les Moust., p. 423 (1905), Blanchard.

One new species only has been described in this genus, viz., *W. greenii*, Theobald, from Ceylon. Dr. Lutz refers to another, however, in his synoptic table as *W. leucostigma*.

Wyeomyia greenii. Theobald (1905).

Journ. Bomb. Nat. Hist. Soc., Vol. XVI., p. 247 (1905).

Thorax brown with bronzy scales; pleurae silvery white. Abdomen black with two pure white basal bands on the apical portion and with prominent basal silvery white lateral patches, triangular in form. Proboscis rather short, black; legs black, unbanded.

♀. Head entirely clothed with large flat brown and violet scales, a few grey ones at the sides; proboscis not much more than half the length of the whole body, deep blackish brown; palpi dark-scaled with some creamy scales apically.

Thorax shiny black with large flat metallic bronzy, dull green and mauve scales; scutellum with similar flat scales of various

dull metallic tints; metanotum brown with short black chaetae; pleurae testaceous with silvery grey spots.

Abdomen black, the fifth, sixth and seventh segments with basal white bands, the sides of all the segments with basal triangular white spots, most prominent on the basal segments; the abdomen is compressed basally, depressed apically.

Legs blackish; femora pale beneath, unbanded, rather thick; ungues small, equal and simple. Wings with brown scales, the lateral vein-scales linear, rather dense, first sub-marginal cell longer and narrower than the second posterior cell, its stem about two-thirds the length of the cell, stem of the second posterior as long as the cell; posterior cross-vein nearly twice its own length distant from the mid.

Length.—4 mm.

♂. Head clothed with flat dusky scales; antennae brown, the lower third with the long verticillate hairs, upper two-thirds with dense short hairs only, except for one group of three or four long ones towards the middle of the short-haired area; palpi small, black-scaled; proboscis rather longer than in the ♀, black.

Thorax clothed as in the ♀; prothoracic lobes white-scaled.

Abdomen black with rich violet reflections and with basal lateral white triangular spots; apical segment expanded, basal lobes of genitalia very large, scaly and hairy. Legs brown unbanded.

Length.—4 mm.

Habitat.—Peradeniya, Ceylon (E. E. Green).

Time of capture.—January and February (1902).

Observations.—Described from a perfect ♂ and ♀. It is the only member of this genus yet found in Ceylon. The general appearance at once separates it from all allied forms, except *Phoniomyia longirostris*, but the proboscis is shorter and not longer than the body as in that genus.

The metanotal chaetae are difficult to see, and the strange ♂ antennae appear to be rather contorted.

WYEOMYIA (?) LEUCOSTIGMA. Lutz (nom. nud.).

Mosq. do Brasil, p. 14 (1904), Lutz (in Bourroul).

Lutz refers to this species as being distinct from the other two Brazilian *Wyeomyia* in a synoptic table. It has white scales on the metanotum.

Typical *Wyeomyias* have not, but the species is retained here until the opportunity occurs of examining it.

Genus **PHONIOMYIA.** Theobald.

Mono. Culicid. III., p. 311 (1903), Theobald; Gen. Ins. Fam. Culicid. p. 38 (1905), Theobald; Les Moust., p. 425 (1905), Blanchard; Mosq. do Brasil, p. 7 (1904), Lutz in Bourroul.

Three new species have been added to this genus since 1903, and two new ones are described here.

The species known are:—

P. longirostris, Theobald (Mono. Culicid. II., p. 275, and p. 277 (1901), and III., p. 311 (1903).
P. quasilongirostris. n. sp.
P. pallidoventer. n. sp.
P. bimaculipes, Theobald (Ann. Mus. Nat. Hung. II., p. 114, 1905).
P. indica, Theobald (Ann. Mus. Nat. Hung. III., p. 115, 1905).
P. magna, Theobald (Ann. Mus. Nat. Hung. III., p. 117, 1905).

Phoniomyia quasilongirostris. n. sp.

Resembles *P. longirostris*, but the mid legs have the second, third and fourth tarsals all white and also the fifth except its apex, and the hind legs have the last two tarsals with white bases beneath. The stem of the first sub-marginal cell is about one-fourth the length of the cell, whilst in *longirostris* it is only a little less than one-half its length. The metanotum has also only three chaetae, and there are no abdominal bands. It is also larger.

Length.—4 mm., with proboscis 8 mm.

Habitat.—Mana, Rio de Janeiro, in Brazil (Dr. Fajardo).

Time of capture.—April.

Observations.—Described from two ♀'s. They much resemble *P. longirostris*, but there are some differences which are pointed out above. I feel some hesitation, however, in treating it as a distinct species.

Phoniomyia pallidoventer. n. sp.

Head deep brown with silvery scales in front; proboscis deep brown. Thorax brown; pleurae brown with white puncta. Abdomen almost black with a silvery white spot on each side forming a white line; genitalia yellowish. Legs deep brown; mid legs with the tarsi silvery white, except one side of the second and the last, which show jet black; hind legs with a basal white spot beneath on the last two segments.

♂. Head deep brown, clothed with flat silvery scales in front, dark ones with dull violet reflections behind; antennae deep brown; palpi very small, deep brown; proboscis long, deep brown, curved downwards, not quite as long as the whole body; clypeus brown, long.

Thorax deep shiny black with broad spindle-shaped bronzy scales, which are very dense over the wings and in front of the scutellum, and slightly broader; scutellum with larger flat scales, the mid lobe with mixed black and white ones, four black border-bristles to the mid lobe, three to each of the lateral lobes; prothoracic lobes mauve, orange and brown; metanotum black with two brown chaetae arising each from a black spot; pleurae brown with dense silvery puncta.

Abdomen deep black with metallic violet reflections in places, narrowed basally, expanded apically, with lateral snowy white patches to the segments forming a white lateral line, border-bristles short and pale; genitalia pale testaceous; apex densely hairy.

Wings with the fork-cells very long and thin, the first submarginal longer but not much narrower than the second posterior cell, its base a little nearer the base of the wing, its stem about one-third the length of the cell, stem of the second posterior about three-fourths the length of the cell; posterior cross-vein about one and a half times its own length from the mid.

Legs deep brown, fore unadorned, mid with first tarsal white on one side, second and third tarsals all white, third white on one side, fourth dark. The dark apex has the scales outstanding, giving the leg a semi-paddle-like appearance. In the hind legs the last two tarsals are white at the base beneath.

Genitalia very peculiar, the claspers large and curved with a large acute process arising from the base, about half the length of the clasper, other pieces attached to the basal lobes, etc., of curious form, one pair broad, contracted, and then expanding again, ending with a flat striated plate, another process broad plate-like and thickened at one edge.

Length.—3 mm.

Habitat.—Rio de Janeiro.

Observations.—Described from a perfect male (parts mounted in balsam).

The densely scaled black apex to the mid legs and the silvery white sides of the abdomen are alone sufficient to identify it.

PHONIOMYIA BIMACULIPES. Theobald (1905).

Ann. Mus. Nat. Hung. III., p. 114 (1905).

Head bright blue in front, black behind. Thorax shiny brown, bright testaceous in front with scanty small brown scales; pleurae deep brown; base of wings pale testaceous. Abdomen black with apical silvery white spots and silvery areas ventrally. Legs brown, unbanded; the femora of all the legs with two silvery spots on one side.

♀. Head clothed with small flat bright blue scales in front, black ones behind, the two colours forming a distinct contrasted line; palpi brown, small; proboscis brown, thin, long, as long as the whole body; antennae brown, basal segment bright testaceous; verticillate hairs brown.

Thorax deep brown, shiny, but bright testaceous in front, with narrow-curved black scattered scales; prothoracic lobes bright testaceous with small black spatulate flat scales; scutellum testaceous with flat black scales and four median lobe border-bristles; metanotum deep brown, testaceous in the middle; pleurae deep brown in the middle, testaceous above and under the wings.

Abdomen deep brown, with silvery blue apical lateral lines and numerous golden bristles on the apex.

Legs with pale yellowish coxae with some silvery scales; femora brown, the fore and the mid with two round silvery spots (pale blue in some lights under two-third power); in the hind legs the median spot is drawn out into a long silvery streak and the second silvery spot is large and near the apex; ungues small equal and simple. (In some light the legs have a bronzy ochreous hue).

Wings with typical scales; the first fork-cell a little longer and much narrower than the second, its base nearer the apex of the wing, its stem about two-thirds the length of the cell, stem of the second posterior cell also nearly two-thirds the length of the cell; posterior cross-vein about its own length distant from the mid cross-vein; scales on the upper costal border very long, dark and spiny. Halteres pale at the base, half the stem and the knob dark brown.

Length.—3·5 mm.

Habitat.—New Guinea at Moroka 1300 m. (Loria, vii.–xi. 1893) and Friedrich-Wilhelmshafen (Biró, 1901).

Observations.—Described from three ♀'s. It is a very

distinct and beautiful species and can at once be told by the two silvery spots on the femora and the beautifully ornamented head.

Type in the National Museum of Hungary, Budapest.

PHONIOMYIA INDICA. Theobald (1905).

Ann. Mus. Nat. Hung. III., p. 115 (1905).

Head black, with deep violet to black scales; palpi and proboscis violet black. Thorax black with bronze and metallic green scales, a pale apple green and azure blue area behind roots of wings; metanotum chestnut-brown with black chaetae; pleurae and a line on each side in front of the root of wings silvery. Abdomen deep violet with basal lateral triangular silvery spots. Proboscis of ♂ nearly as long as the whole body.

♂. Head black, completely clothed with flat scales showing violet or black in colour according to the light, and in certain lights a dull silvery patch between the eyes; antennae, palpi, clypeus and proboscis black, the palpi very short, the clypeus showing a dull grey sheen.

Thorax shiny black, clothed with irregularly arranged small bronzy spindle-shaped scales and large flat violet, blue and green scales, a line of dull silvery scales in front of the root of each wing at the side, and in some lights there appears an apple-green line behind; the large flat scales are most dense just behind the root of the wings where they are very large and project outwards and also just before the scutellum; prothoracic lobes with flat various shaded scales, and there are numerous short stout bristles projecting forward from the mesonotum over the head; scutellum testaceous with flat black scales; border-bristles black, four large and some small ones on the mid lobe; metanotum brown with a dense patch of short black bristles, radiating outwards; pleurae reddish-brown with patches of silvery white scales.

Abdomen deep violet, almost black in some lights, with silvery white triangular basal lateral spots, apex swollen and very bristly; claspers very small and delicate, pale grey.

Legs bronzy brown, deep ochreous at their base, the coxae having a patch of silvery scales; femora paler beneath than remainder of the legs.

Wings with dense brown scales, the first sub-marginal cell longer but very slightly narrower than the second posterior cell,

its base very nearly level with the base of the second posterior cell, its stem about half the length of the cell, stem of the second posterior nearly as long as the cell; posterior cross-vein



Fig. 275.
Wing of *Phoniomyia indica*. ♀. Theobald.

about the same size as the mid cross-vein and scarcely one and a half times its own length distant from it. Halteres rather stout, stem pale, knob fuscous.

Length.—4 mm.

Habitat.—Singapore (Biró, 1902).

Observations.—Described from a perfect male. It most nearly approaches *P. longirostris*, Theob., but can at once be told by the shorter proboscis and unadorned legs. The male claspers very small and pallid.

Type in the National Museum of Hungary, Budapest.

PHONIOMYIA MAGNA. Theobald (1905).

Ann. Mus. Nat. Hung. III., p. 117 (1905).

Head black with black, violet, dull mauve and grey reflections; palpi and proboscis deep brown; clypeus brown. Thorax deep blackish-brown with metallic brassy yellowish and violet scales; scutellum scales silvery; prothoracic lobes mauve scaled. Abdomen deep brown above, unbanded; yellowish below with grey scales. Legs deep brown, yellowish basally, unbanded. Wing scales dense, brown.

♀. Head black with flat scales showing black, violet, dull mauve and grey reflections when held in different lights; palpi black scaled; antennae deep brown, basal segment with grey sheen above; proboscis long, thin, acuminate, deep brown; clypeus with grey sheen.

Thorax black with spindle-shaped brassy-yellowish scales, some showing violet and mauve reflections; scutellum with flat silvery-white scales, the basal ones dusky in some lights; prothoracic lobes with mauve scales, dusky when viewed in some lights; pleurae deep brown with some white scales.

Abdomen testaceous, covered with deep brown scales above; yellowish below with grey to almost white scales.

Legs yellowish with deep brown scales, which are scanty basally and so appear yellowish; ungues small, equal and simple.

Wings with the first sub-marginal cell considerably longer and but slightly narrower than the second posterior cell, its stem a little more than one-fourth the length of the cell; stem of the second posterior more than one-half the length of the cell; base of the first sub-marginal considerably nearer the base of the wing; the posterior cross-vein shorter than the mid, about its own length distant from it. The bases of the wings are pale testaceous. Halteres testaceous, both stem and knob with blackish scales.

Length.—5 mm.

Habitat.—S. Antonio, Bolivia.

Observations.—Described from a single female. It is one of the largest of the genus and should at once be told by its silvery-grey scutellum, its densely scaled thorax and its mauve prothoracic lobes.

Type in the National Museum of Hungary, Budapest.

Genus **DENDROMYIA.** Theobald (1903).

Heizmannia. Ludlow (1905).

Mono. Culicid. III., p. 313 (1903), Theobald; Canad. Entomo. XXXVII., p. 130 (1905), Ludlow (*Heizmannia*); Les Moust., p. 426 (1905), Blanchard; Mosq. do Brasil, p. 7 (1904), Lutz; Gen. Ins. Fam. Culicid., p. 39 (1905), Theobald.

Two new species have been added from outside South America, from whence Dr. Lutz has described three new ones (*personata*, *oblita* and *serrata*).

The genus is a very marked one, but by some error in writing to Miss Ludlow I seem to have wrongly advised her, and in consequence she founded a new genus *Heizmannia* for an undoubted *Dendromyia*. Regarding the characters of *Heizmannia* Miss Ludlow writes as follows:—

"Head covered with broad flat scales; thorax with flat spindle-shaped scales, very broad on the lateral thirds of the mesonotum; scutellum with broad flat scales; metanotum with large median bunch of chaetae (not less than 16–20) on caudal

half; wing scales somewhat resembling *Taeniorhynchus* scales, but the median scales at times inclined to be asymmetrical. Cells small. Ungues in ♀ simple and equal.

The genus evidently lies near *Dendromyia*, but Mr. Theobald says it cannot be included under that genus, the large bunch of bristles on the *mesonotum* being too marked a characteristic and I therefore give it a place by itself."

The genus now contains the following species: —

D. ulocoma, Theobald (Mono. Culicid. III., p. 313, 1903).
D. asullepta, Theobald (ibidem, p. 315, 1903).
D. paraensis, Theobald (ibidem, p. 316, 1903).
D. quasiluteoventralis, Theobald (ibidem, p. 317, 1903).
D. luteoventralis, Theobald (Mono, Culicid. II., p. 348, 1901).
D. scintillans, Ludlow (Canad. Ento. XXXVII., p. 130, 1905).
D. mitchellii, Theobald (Mosq. of Jamaica, p. 37, 1905).
D. smithii, Coquillett (Canad. Ent. XXXIII., p. 260, 1901).
D. oblita, Lutz (Mosq. do Brasil, pp. 49 and 68, 1904).
D. personata, Lutz (Mosq. do Brasil, pp. 22, 49 and 68, 1904).
D. serrata, Lutz (nom. nud.), n. sp.

TABLE OF BRAZILIAN SPECIES (Lutz).

Prothoracic lobes with brilliant golden scales ... *asullepta.* Theobald.
Prothoracic lobes without golden scales.
Anterior feet in parts white below *personata.* Lutz.
Feet all one colour: metanotum grey; eyes with white margin *oblita.* Lutz.
Abdomen with basal lateral patches..... *paraensis.* Theobald.

Dendromyia scintillans. Ludlow (1905).

Heizmannia scintillans. Ludlow.

Canad. Entomo. XXXVII., p. 130 (1905).

Head brown, with brown iridescent peacock blue and green scales, heavy white rim around eyes, white spot between.

Thorax brown with iridescent scales, prothoracic scales white; scutellum with brown scales.

Abdomen with broad dark (almost black) iridescent scales, venter with broad white bands. Legs unbanded.

"♀. Head brown, with brown flat, iridescent (peacock blues and greens) scales, heavy white rim around the eyes, and a white spot between the eyes (at point of vertex); palpi brown; proboscis brown, a few bristles at the base; eyes and clypeus brown.

Thorax brown; mesonotum densely covered with dark flat, broadly spindle-shaped iridescent scales; prothoracic lobes heavily covered with broad flat, white scales; pleurae brown, thickly covered with broad flat,

white scales; scutellum brown, densely covered with broad flat, brown iridescent scales; metanotum rich brown, with heavy median bunch of brown bristles (not less than 16–20) on caudal half.

Abdomen dark, densely covered with broad dark (almost black) flat iridescent scales; venter with broad white bands, very broad on the cephalic segments, which extend so far around as to appear from the dorsal aspect like basal lateral white spots.

Legs, coxae and trochanters light; femora of hind legs ventrally light, less so on the other legs, and otherwise the legs are dark brown; the tarsal segments of fore and mid legs in some lights are almost a fawn colour; all the ungues equal and simple.

Wings clear, with heavy brown scales resembling those found in *Taeniorhynchus*, but the median scales, especially on the costa, sub-costa and first long veins, heavier and inclined at times to be asymmetrical; cells short; first sub-marginal a little longer and about the same width as the second posterior cell, the stems a little shorter than the cells; supernumerary and mid cross-veins are about the same length, and meet the posterior cross-vein a little longer, and one and a half times its length distant. Halteres have white stem and dark knob.

Length.—About 4 mm.; proboscis 2 mm.

Habitat.—Camp Stotzenberg, Angeles, Pampanga, Luzon, Philippine Islands.

Time of capture.—September ?.

Observation.—Described from one specimen, perfect except as to the antennae, sent by Dr. Whitmore (Ludlow)."

DENDROMYIA MITCHELLII. Theobald* (1905).

Mosquitoes of Jamaica, p. 37 (1905).

Head deep brown, with grey scales at the sides; proboscis and palpi deep brown; antennae brown. Thorax deep shiny brown, clothed with deep brown scales; pleurae bright ochraceous, with patches of silvery white scales. Abdomen deep blackish, with grey or creamy venter; unbanded and unspotted; apex dark ventrally, with black bristles; legs long and thin, deep brown, except one side of the last three mid tarsals (and the tip of the fifth, which is black), and the apex of the second, which are shiny silvery white. Wings with brown scales; fork-cells long.

♀. Head deep brown, clothed with flat deep brown scales, except around the eyes, where there is a broad border of grey

* This has been referred to by Blanchard and Bourroul under a MS. name *medioalbipes:* it was never described under this name so it must be abolished.

scales showing violet reflections, and at the sides, and also a creamy patch in the middle in front; a few curved black bristles project forward over the eyes. Proboscis deep blackish brown, nearly as long as the abdomen, slightly swollen apically. Palpi deep blackish brown, with short black bristles, about one-eighth the length of the proboscis; antennae deep brown, with long dark verticillate hairs and grey pubescence on the internodes. Eyes black (in the dead insect).

Thorax deep shiny black, clothed with irregularly disposed, bronzy-black, flat, spindle-shaped scales and large, flat, spatulate ones with dull violet reflections over the roots of the wings, and deep brown bristles; there are also large, flat scales before the scutellum. A few grey scales in front over the head; prothoracic lobes clothed with small, flat, brown scales above, with dull silvery white ones below; a patch of small, flat, silvery white scales on each side of the mesonotum in front, scarcely showing in the dorsal view; scutellum testaceous, clothed with small, flat, dull brownish violet, spatulate scales and brown border-bristles; metanotum deep to bright brown according to the light, with a few chaetae arising from black spots towards its apex; pleurae ochraceous, with patches of small, white, flat scales.

Abdomen blackish, the scales showing dull violet reflections, border-bristles very small and pallid; venter entirely clothed with dull white scales and a few black ones apically, and with many straight black bristles at the apex.

Legs long and thin, deep blackish brown with bronzy reflections, the hind femora dilated apically, the last three mid tarsals and the apex of the second silvery white on one side, except just at the apex of the last segment; ungues small, equal and simple.



Fig. 276.
Wing of *Dendromyia mitchellii*. ♀. Theobald.

Wings with brown scales, those on the apex of the two branches of the second long vein slightly broadened, some of the other lateral vein-scales long and rather thin, especially on the stem of

the second and on the fourth; first sub-marginal cell considerably longer and a little narrower than the second posterior cell, its base nearer the base of the wing than that of the latter cell, its stem about one-third the length of the cell; stem of the second



Fig. 277.
Another wing of *Dendromyia mitchellii*. ♀. Theobald.

posterior cell about two-thirds the length of the cell; posterior cross-vein longer than the mid cross-vein, about half its own length distant from it; mid and supernumerary cross-veins almost in a straight line. Halteres with pale ochraceous stem and fuscous knob.

Length.—4 mm.

Time of capture.—January (1904).

Habitat.—Jamaica.

Observations.—Described from a perfect female taken by Dr. Grabham. It can at once be identified by the white mid tarsals. This coloration appears to be on one side only, apparently the upper surface.

It can be at once told from the other species by the above character and the cephalic adornment. No special notes have been made on this insect. There are more lateral linear scales to the wings than in the type of the genus, but it more nearly approaches *Dendromyia* than *Wyeomyia*.

DENDROMYIA QUASILUTEOVENTRALIS. Theobald (1903).

Mono. Culicid. III., p. 317 (1903).

Additional locality.—New Amsterdam, British Guiana (Dr. Rowland). This specimen shows the venter of the abdomen paler than in the type, in some lights creamy white.

DENDROMYIA SMITHII. Coquillett (1901).

Wyeomyia smithii. Coquillett.

Aedes smithii. Coquillett.

Canad. Entomo. XXXIII., p. 260 (1901), Coquillett; Journ. N. Y. Ent. Soc. IX., p. 178 (1901), Dyar; Mono. Culicid. III., p. 295 (1903), Theobald; Rept. N. Jer. St. Agri. Exp. Sta. on Mosquitoes, pp. 342–353 (1904) Smith; Mosq. N. York, Bull. 79, Ent. 22, N. Y. St. Mus., pp. 340, 341, 375, 376, 377, 378 (1904), and App. 391, e., Felt; 20th Rept. St. Entomo. Bull. 97, Ent. 24, N. Y. St. Mus., pp. 444, 446, 463, 464, 491, 493–494 (1905), Felt; Les Moustiques, p. 408 (1905), Blanchard.

Head with black scales, paler ones at the sides and extending to some extent around the border of the eyes; palpi and proboscis black. Thorax deep blackish brown except the prothoracic lobes, which are mauve; pleurae testaceous with white puncta. Abdomen deep brown above, silvery white ventrally. Legs deep bronzy brown.

♀. Head deep brown, with blackish brown almost black flat scales, pale at the sides and extending to some extent around the eyes, and sometimes forming a pale grey area between them extending on to the occiput; palpi and proboscis deep blackish-brown; antennae blackish-brown, some black scales on the second segment; chaetae of head black, two prominent ones projecting forwards between the eyes from the pale scaled area.

Thorax deep blackish-brown with large flattened dusky scales, black to dull brown with slight greenish-brown reflections in some lights, becoming larger and extending over the scutellum; the prothoracic lobes are clothed with flat metallic mauve scales;



Fig. 278.
Dendromyia smithii. ♀. Coquillett.

metanotum bright brown with a bunch of dark brown chaetae; pleurae pale ochreous to testaceous with patches of silvery-white scales.

Abdomen uniformly deep blackish brown to almost black

dorsally, dull silvery white with sometimes slight ochraceous hues ventrally.

Legs deep brown above with brassy reflections, pale scaled below; ungues small, equal and simple.

Wings with large dense scales on the apices of the veins; the first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem nearly one-fourth the length of the cell, stem of the second posterior cell not quite half the length of the cell; posterior cross-vein slightly longer than the mid, about its own length distant from it.

Length.—3 mm.

♂. Resembles the ♀ in general appearance. The legs have the fore ungues nearly equal, the mid much curved and very unequal, hind equal and simple.

Antennae more pilose than the ♀ and the fork-cells rather shorter.

Genitalia of the male with basal lobes stout, with small basal setaceous lobe—the claspette. This segment is unique on account



Fig. 279.
Wing of *Dendromyia smithii.* ♂. Coquillett.

of its distal portion being composed of two equal lobes very slightly connected posteriorly. The terminal segment is most remarkable, and is best described by referring to Felt's figure. The harpogones are smaller than the harpes, both consisting of a broad basal plate-like structure rounding abruptly to a short, stout blade-like segment armed with a conspicuous spine and with its apex abruptly truncate. Unci broad, plate-like, fused mesially to form a keel-like structure. Setaceous lobes small, each bearing four or five long, stout setae.

Habitat.—Lahaway, New Jersey (J. B. Smith); Florida (D. W. Coquillett); Old Forge, New York State (E. P. Felt); Rio de Janeiro (Dr. Fajardo).

Observations.—I have re-described this species from a series sent me by Professor E. P. Felt. Coquillett described it as an

Aedes, but E. P. Felt, J. B. Smith, and others have placed it in the genus ***Wyeomyia.***

Since then I formed the genus ***Dendromyia,*** in which the wing scales are broader than in ***Wyeomyia.*** It comes in the former genus.

This is the insect referred to under ***Aedes fuscus*** (Vol. III., p. 286) as living in its larval stage in the pitchers of ***Sarracenia*** —a note taken from Howard's "Mosquitoes," p. 153 (1901), in which ***Uranotaenia sapphirina*** is figured as ***Aedes fuscus*** on the same page.

The habits and life-history are ably given by Professor J. B. Smith. From this author the following is abridged: -

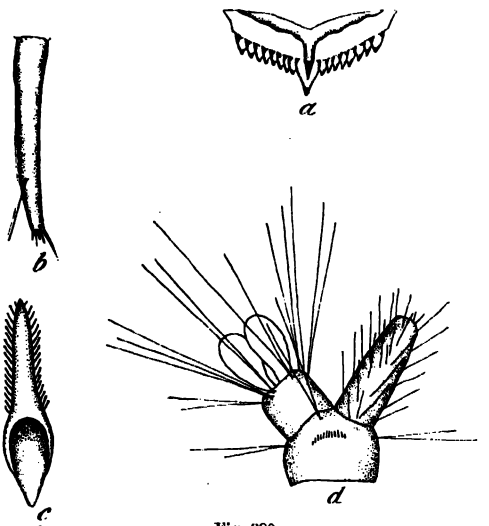


Fig. 280.
Dendromyia smithii. Coquillett.
a, Labial plate; b, antenna; c, scale of 8th segment; d, siphon and anal segments (after Smith).

The adult is disinclined to bite. The resting position is similar to that of all ***Wyeomyias,*** the hind legs being held up above the body over the back.

The adults appear towards the end of May and issue irregularly until early November. The larvae live in the water that is found in the pitchers of the Pitcher Plants (***Sarracenia***), often in large numbers. The water in these pitchers freezes in winter, and the larvae are found completely frozen. This does not in the least affect them. Mr. Brakeley cut out a few of the pitcher plant leaves, stripped them from the core of solid ice, and found the

wrigglers embedded in it in all shapes, most in a half coil. The temperature had been down to two degrees below zero.

These lumps of ice were slowly melted and the larvae gradually freed. They fell to the bottom, rested, and as the ice in the water decreased, gradually became active.

The larvae were found to feed well, but in spite of being kept warm they developed but slowly.

They pupated in March, and in three days the adults appeared. In the open the first pupa seen was on April 16th.

Some of the larvae received by Professor J. B. Smith that must have come from eggs laid in November did not hatch out until September, thus remaining in the larval stage ten months.

The eggs are mostly laid on the young leaves when still perfectly dry, both at the bottom and sides, singly or in groups.

The eggs are chestnut brown, bean-shaped, the ends somewhat pointed, and show an irregular tessellated reticulation.

That the larvae do not need air as *Culex* we know, because Howard kept them for two weeks under a film of oil. This is because there is a complex tracheal system in the anal processes, which form really a gill structure, so that the insect gets its oxygen direct from the water.

Professor J. B. Smith sums up the life-history as follows: "The insect winters in the larval stage, freezing and thawing as often as need be during that season. It pupates late in May, and becomes adult a week or ten days later. Eggs are laid in the leaves, singly or in small groups, fastened to the sides or floating on the surface. The summer broods mature in about a month, and there are three, if not four, series; but the broods overlap so much that the breeding is practically continuous. Late in the season the adults select the new leaves for oviposition even if they are yet dry." D. W. Coquillett informs Professor J. B. Smith that he has this species from Florida, where it breeds in the leaves of orchidaceous plants growing on trees.

The larvae vary in length from 5 to 6 mm.; creamy white in colour with slightly dusky head; the antennae are short, and have the lateral tuft represented by a single hair only, near the apex; labial plate broad and narrow, a large apical tooth and from 7–10 on each side; lateral combs of eighth segment consist of 11 to 15 scales arranged in a single row, the scales are rather long and fringed with hairs on each side; there is no pecten on the siphon, which is, however, provided with numerous long hairs all over its surface.

DENDROMYIA OBLITA. Lutz (1904).

Mosquitos do Bresil, pp. 49 and 68 (1904), Lutz (in Bourroul).

Head and thorax brown, pleurae pale silvery. Abdomen deep brown, traces of pale creamy lateral areas and pale creamy venter. Legs all brown except the last three tarsals and apex of the second. Wings with the fork-cells shorter than in *D. personata*, Lutz.

♀. Head deep brown, clothed with flat brown scales showing violet reflections, white ones at the sides and a narrow white border around the eyes with a patch of white ones between them in front and extending as a line between them; palpi, proboscis and antennae deep brown with dull violet reflections.

Thorax deep brown, with irregularly-disposed flat dusky black scales showing dull violet reflections, scutellum with similar-coloured but larger flat scales, mid lobe with apparently only two posterior border-bristles; prothoracic lobes with brown and some creamy and white flat scales; metanotum paler brown with two median dark areas and brown chaetae; pleurae ochreous and brown with flat silvery white scales, especially dense in front and with a few dusky ones in the mid region.

Abdomen deep brown with dull violet reflections, some creamy scales laterally forming a thin line and it is creamy scaled ventrally.

Legs deep brown, with metallic bronze and violet reflections, femora paler beneath, the mid legs with the last three tarsals and apex of the second dull white; ungues equal and simple.

Wings with some thinnish lateral scales, but many typical *Dendromyian* ones on the first and apices of other veins; the



Fig. 281.
Wing of *Dendromyia oblita*. ♀. Lutz.

first sub-marginal cell longer and narrower than the second posterior cell, its base slightly nearer the base of the wing, its stem about one-half the length of the cell; stem of the second

posterior a little more than half the length of the cell; posterior cross-vein about two-thirds its own length distant from the mid cross-vein.

Length.—4 mm.

Habitat.—São Paulo and Goyaz, Brazil (Dr. Lutz).

Observations.—Re-described from a perfect female sent by Dr. Lutz. It can be told by the legs having white only on the mid tarsals. The wings also have shortish fork-cells and many thin lateral veins, thus bringing it near to *Wyeomyia*, but there are many typical *Dendromyian* ones, and it is placed as Lutz has done provisionally in this genus. It comes uncommonly near *Dendromyia mitchellii*, Theobald, and may be the same.

DENDROMYIA PERSONATA. Lutz (1904).

Mosquitos do Brasil, pp. 22, 49 and 68 (1904), Lutz (in Bourroul).

Head and thorax deep brown, except pleurae, which are pale ochreous. Abdomen deep brown with dull violet reflections, a



Fig. 282.
Male genitalia of *Dendromyia personata*. Lutz.

pale creamy stripe along each side and pale creamy venter. Legs deep brown with metallic violet and coppery hue, the mid and hind legs with snowy white ornamentation on some of the apical tarsal segments. Wings with the fork-cells long.

♂. Head brown, clothed with rather large flat dull brown scales at the sides, dull pale violet and blue in the middle and a few pale ones around the border of the eyes, two long dark parallel chaetae project forward between the eyes and some smaller ones project inwards along the orbital margin. Clypeus rather long, bright brown; palpi and proboscis deep brown, with dull metallic violet reflections; antennae brown, with bright brown basal segment, densely pilose.

Thorax deep brown, with very large flat elongate dusky black scales irregularly arranged, a few pale creamy ones in front near the head, those on the scutellum the same colour; prothoracic lobes with smaller but similar coloured scales and some pale apical ones and black chaetae; metanotum black, chaetae with pallid reflections; pleurae ochreous in front and above, darker below with flat silvery white and creamy scales.

Abdomen deep black, with dull metallic violet reflections, on each side of all the segments a pale creamy spot extending the whole length of the segments, thus forming a continuous nearly straight pale lateral line; venter also pale creamy except at the base where it is white.

Legs brown, with metallic violet and bronzy reflections, the fore legs unicolorous, the mid with some snowy-white on the first and second tarsals and a white spot at the junction of the first and second tarsals; hind legs deep brown above, except on the last two tarsals, the whole of the under side pure silvery white, so that the leg in some lights and directions looks all silvery white. Fore and mid ungues slightly unequal, simple; hind equal and simple.

Wings with brown-scaled veins; the first sub-marginal cell



Fig. 283.
Wing of *Dendromyia personata*. ♂. Lutz.

much longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem one-fourth the length of the cell; stem of the second posterior cell two-thirds the length of

the cell; posterior cross-vein longer than the mid and not quite its own length distant from it.

Genitalia with short thick basal lobes narrowed apically (cone-shaped) with a long row of closely-set long golden flattened hairs; apex of basal lobe with a few chaetae only; claspers long, with a lamellate side area near the acute apex (other structures shown in figure).

Length.—3 mm.

Habitat.—São Paulo (Dr. Lutz).

Observations.—Re-described from two perfect males given me by Dr. Lutz. It differs from *D. serrata* in having the pale lateral abdominal line and pale venter, in its more dusky hue on the thorax, leg markings, and in the very marked genitalia. The leg markings appear varied owing to the legs becoming twisted in death and the lower pale scaled areas consequently showing above.

DENDROMYIA SERRATA. Lutz MS. (nom. nud.).

Head and thorax deep dull brown; pleurae with silvery puncta. Abdomen deep black with silvery-white lateral patches, mainly apical and silvery-white venter. Legs deep brown, unbanded, but the under side of hind and fore tarsals grey to white.

♀. Head deep brown, with flat brown scales, a few violet ones in the centre and pale ones around the eyes, lateral scales pale creamy-white; a white scaled line between the eyes, with two long nearly parallel brown chaetae projecting forwards from it, other chaetae deep brown; palpi, proboscis and antennae deep brown with some metallic reflections on the proboscis.

Thorax brown, with flat broadish dull brown scales irregularly disposed; prothoracic lobes with dull brown and creamy scales; scutellum with large flat dusky brown scales, showing dull violet reflections; metanotum deep brown with brown chaetae; pleurae brown, with dense large silvery-white flat scales, which extend up to the edge of the dorsum of the mesonotum forming a definite line between the dark and pale areas.

Abdomen contracted and narrow in front, broadened apically, deep blackish-brown, with lateral pale spots mainly apical in situation; venter pale silvery.

Legs deep brown, unbanded, the end tarsals of hind legs and to some extent the fore show pale colours, due to paler ventral scales, the hind being almost white; ungues small, equal and simple.

Wings with brown scales; fork-cells moderately long, the first sub-marginal longer, but very little narrower than the second posterior cell, its base nearer the base of the wing, its stem more than one-third the length of the cell; stem of the second posterior cell about two-thirds the length of the cell; posterior cross-vein longer than the mid, not quite its own length distant from it; scales normal. Halteres with brown stem and fuscous knob.

Length.—4 mm.

♂. Similar to ♀, but with plumose brown antennae; the lateral abdominal spots and venter more golden than in the ♀. Wings similar, but the fork-cells shorter. Fore and mid ungues unequal, simple, the larger one of the mid legs sickle-shaped.



Fig. 284.
Dendromyia serrata. Lutz.
♂ genitalia.

Genitalia with rather short basally expanded basal lobes, and having at their apex a dense tuft of long flattened chaetae curved at their ends; claspers of extraordinary form, being broadly expanded towards apex, with a curved beak-like termination projecting from the expanded portion, which has a fringe of hairs below the large terminal curved spine; beneath the claspers is a group of large black spines curved apically and longer than the rest of the genitalia.

Length.—3·8 mm.

Habitat.—Cantarinora, Poussoria, Brazil (Dr. Lutz).

Time of capture.—January.

Observations.—Re-described from a perfect ♂ and ♀ given me

by Dr. Lutz. It is a somewhat obscure species allied to *D. ulocoma*, Theobald, but at once told by the abdominal lateral spots, and from *D. paraensis*, Theobald, by the narrow white scaled line between the eyes, not a knob-like patch of yellow ones as seen in *paraensis*.

Genus **SABETHOIDES.** Theobald (1903).

Sabettoides. Blanchard (1905).

Mono. Culicid. III., p. 328 (1903), Theobald; Les. Moust., p. 423 (1904), Blanchard; Gen. Ins. Fam. Culicid., p. 39 (1905), Theobald.

A single new species is described here in this genus.

Sabethoides purpureus. n. sp.

Head and prothoracic lobes metallic violet, the latter with a few golden scales. Thorax deep shiny black, with dull dusky apple green scales and broad creamy lateral ones; pleurae black, with flat silvery scales. Scutellum with apple green and azure blue scales. Abdomen rich metallic purple, with coppery red patches, lateral patches of large silvery scales, which are still larger on the upper sides of the venter; apex hairy. Legs unbanded, metallic bronze and purple. Wings yellow at the base.

♀. Head black, clothed with flat metallic violet scales, which become deep brown behind; deep dusky black chaetae around the eyes, and two very long ones projecting between them; antennae, palpi and proboscis deep brown, the latter short; basal segment of antennae with hoary sheen.

Prothoracic lobes black, with flat purple scales and a few golden ones; mesonotum shiny black, with flat apple green scales, dusky in some lights, becoming larger behind and brighter; in front on each side some flat golden-yellow scales and some flat white ones further back; scutellum with flat apple green and coppery scales; pleurae black, with flat silvery scales; metanotum blackish, with four black chaetae.

Abdomen metallic purple with coppery red patches, basal segment with a white patch on each side, laterally are patches of silvery scales, which more or less spread all along the sides, but are largest in the middle of each segment; beneath this is a broad line of very large long spindle-shaped silvery scales; apex densely hairy and with some small white and coppery scales ventrally.

Legs unbanded, with metallic bronze and purple hues; spiny.

Wings with broad, elongate, asymmetrical brown scales, violet at the base of the wings; fork-cells long; the first submarginal much longer and narrower than the second posterior cell, their bases level, stem of the former about one-fourth the length of the cell, of the latter one-half the length of the cell; supernumerary and mid cross-veins, meeting at an angle; the posterior a little nearer the base than the others.

Length.—4 mm.

Habitat.—Rio de Janeiro (Prof. Goeldi).

Observations.—Very near *Sabethoides confusus*, Theobald, but differs in having the head purple and in the purple and silvery white abdomen.

Genus **SABETHINUS.** Lutz (1904).

Sabettinus. Lutz (Blanchard) (1905).

Mosquitos do Brasil, pp. 48 and 57 (1904); Les Moust., p. 634 (1905), Blanchard.

Head clothed with flat scales all over. Thorax with irregular flat scales, which become large behind and over the scutellum where they are more definite in arrangement; metanotum with chaetae and squamae. Proboscis rather short, *dilated at the apex.* Wings with large scales ending asymmetrically; fork-cells long in ♀, shorter in ♂; cross-veins close together, the mid slightly nearer the apex. Antennae of ♀ pilose, of ♂ rather more so. Genitalia very marked, with broad chaetae at the base on each side, long claspers ending in a broad plate with one side prominently fimbriated.

This genus comes very near *Sabethoides*, Theob., in fact it can only be separated by the proboscis being swollen apically, unless there is marked genitalic diversity.

Three species occur which may be tabulated as follows:—

Chaetae at base of wings jet black.
- Thorax metallic green *intermedius.* Lutz.
- Thorax metallic deep blue *albiprivatus.* Lutz.

Chaetae at base of wings light golden-brown *aurescens.* Lutz.

SABETHINUS INTERMEDIUS. Lutz (1904).

Sabettinus intermedius. Lutz (Blanchard) (1905).

Mosquitos do Bresil, p. 48 (1904), Lutz in Bourroul; Les Moustiques, p. 634 (1905), Blanchard.

Head violet and black; proboscis deep brown, short and thick. Thorax deep black, with green, brown and silvery scales; pleurae silvery. Abdomen brilliant metallic violet, with silvery to golden lateral spots and venter. Legs deep brown, with metallic violet and coppery reflections, partly golden ventrally.

♀. Head deep brown, with brilliant violet and blue flat scales in front, flat brown ones at the sides, and a few creamy ones at the sides of the eyes. Clypeus frosty; proboscis short and thick brilliant violet; palpi metallic violet with a few azure blue scales at the base; antennae brown with basal segment brown below, frosty grey apically.

Thorax deep black, clothed with irregular flat greenish blue scales in front becoming much larger and brilliant apple green over the roots of the wings, large brown ones in the middle, similar coloured ones only larger to the mid lobe of scutellum and large apple green ones to the lateral lobes; chaetae black (the apple green scales at times look almost like burnished brass); prothoracic lobes with brown and brilliant violet scales; pleurae rich ochreous with silvery to pale golden flat scales. Abdomen rich metallic violet, with basal lateral silvery to pale golden spots and similar coloured venter.

Legs brown, with deep violet and purple shades and brilliant coppery hues ventrally; ungues equal and simple.

Wings with large brown scales ending asymmetrically; the



Fig. 285.
Wing of *Sabethinus intermedius.* ♀. Lutz.

fork-cells very long, the first sub-marginal cell much longer but no narrower than the second posterior cell, its base a little nearer the base of the wing, its stem less than one-fifth the

length of the cell; stem of the second posterior cell about one-third the length of the cell; cross-veins all close together the mid very slightly nearer the apex of the wing than the other two; wings long and narrow.

Length.—5 mm.

♂. Similar to ♀ in general appearance. Fork-cells of wings not so long as in *S. albiprivatus*, the first sub-marginal longer and narrower than the second posterior, its base nearer



Fig. 286.
Wing of *Sabethinus intermedius*. ♂. Lutz.

the base of the wing, its stem about one-fourth the length of the cell; stem of the second posterior cell more than half the length of the cell; the posterior cross-vein longer than the mid and behind it. Genitalia with three large chaetae at the base on each side; claspers long, ending in a broad plate with one side fimbriated.

Habitat.—Brazil.

Observations.—Re-described from a single ♀ given me by Dr. Lutz. There are no very marked features except the general adornment of scales on the metanotum and the brilliant abdomen. The short sword-like proboscis is marked in this species which is the type of Lutz's genus *Sabettinus*.

SABETHINUS ALBIPRIVATUS. Lutz (MS.).

Head with metallic violet scales. Thorax with *metallic bright blue* scales. Abdomen deep metallic violet with lateral silvery to pale golden lateral spots and venter.

♀. Head clothed with flat brown and deep violet scales in front; palpi and proboscis deep brown with violet reflections; clypeus and basal segment of antennae frosty.

Thorax deep shiny black clothed with large flat bright blue scales (appearing brown in certain lights) a few apple green ones before the scutellum and larger ones on it of a similar colour; chaetae over the roots of wings black; pleurae bright ochreous with flat silvery scales; metanotum brown with brown chaetae.

Abdomen bright metallic violet, with large basal silvery lateral spots and similar coloured venter, showing pale golden reflections in some lights; apical hairs black. Legs deep brown with metallic violet hues.

Wings with very large dense asymmetrical brown scales showing metallic violet reflections; fork-cells long, the first sub-marginal longer but no narrower than the second posterior cell, its base a little nearer the base of the wing, its stem one-fourth



Fig. 287.
Wing of *Sabethinus albiprivatus*. ♀. Lutz.

the length of the cell; stem of the second posterior cell about one-third the length of the cell; mid cross-vein a little nearer the apex of the wing than the other two, the posterior longer than the mid.

Length.—4·5 to 5 mm.

♂. Antennae more pilose than in the ♀; palpi very short but slightly longer than in the ♀.

Genitalia with the basal spines thick, four one side, three the other; median processes with apical teeth.

Wings with very long fork-cells; the first sub-marginal much longer and a little narrower than the second posterior; its base nearer the base of the wing, its stem not quite one-fifth the length of the cell; stem of the second posterior about half the length of the cell; supernumerary and mid cross-veins meet at an angle; posterior in a line with the mid.

Length.—4·8 mm.

Habitat.—Cantoreira, Brazil.

Time of capture.—April.

Observations.—Described from a male and female given me by Dr. Lutz. It differs from *S. aurescens* in the black chaetae over the wings and in the deep bright blue thorax. From *S. intermedius* in the blue thorax and in the male genitalia, wings, etc.

SABETHINUS AURESCENS. Lutz MS. (nom. nudum).

Head deep brown, with violet hues in front; palpi and proboscis deep brown with green reflections. Thorax black, with dense apple-green metallic scales; coppery ones on the prothoracic lobes. Abdomen with deep blue and green scales and basal lateral silvery to golden spots and pale venter. Legs deep brown with purple and coppery sheen. Wings with the fork-cells relatively shorter than in the former species.

♀. Head deep brown with flat brown scales behind, some violet ones in front and a few coppery to golden ones along the eyes; clypeus and basal segments of antennae frosty-grey, the latter with small black hairs, rest of antennae deep brown; palpi and proboscis deep brown with metallic deep green reflections and some traces of violet.

Thorax deep black, clothed with irregular short flat dense apple-green metallic scales, particularly dense over the roots of the wings and on and in front of the scutellum; chaetae bright golden-brown; prothoracic lobes with brassy mauve and creamy flat scales; pleurae ochreous with patches of flat white scales.

Abdomen with deep blue and green metallic scales and basal lateral pale golden to almost silver patches and pale scaled venter, apical hairs black.

Legs deep brown with metallic bronze reflections; ungues equal and simple (?).

Wings with the fork-cells long, the first sub-marginal much longer and slightly narrower than the second posterior cell, its base a little nearer the base of the wing, its stem about one-third



Fig. 288.
Wing of *Sabethinus aurescens*. ♀. Lutz.

the length of the cell; stem of the second posterior two-thirds the length of the cell; cross-veins all close together, the mid slightly nearer the apex of the wing than the other two.

Length.—5 mm.

Time of capture.—April.

Habitat.—Cantoreira, Brazil (Dr. Lutz).

Observations.—Described from a perfect ♀ sent by Dr. Lutz under the MS. name *aurescens*. It can at once be told from the two previous species by the golden-brown chaetae over the roots of the wings, the others having them jet black.

Genus **PHILODENDROMYIA.** nov. gen.

Palpi of ♂ short, of three segments, the apical segment the largest. Antennae of ♂ pilose, verticillate hairs few, long. Head covered with small flat scales, with a median area of narrow-curved ones, widest in front, almost triangular and with numerous upright forked scales; scutellum large, deeply trilobed, clothed with narrow-curved scales. Thorax with narrow-curved scales; metanotum *nude*. Wings with moderately long fork-cells, scales of *Dendromyian* form.

It resembles *Dendromyia*, but can at once be told by the nude metanotum and different squamose head and scutellar characters.

Males only have been received.

Philodendromyia barkerii. n. sp.

Entirely deep brown, but the head paler at the sides. The whole body with dull violet reflections in some lights. Legs unbanded.

♂. Head deep brown, clothed with flat brown and grey scales, some dull yellowish ones in front between the eyes, a large median patch of small dull narrow-curved scales and numerous long black upright forked scales; palpi, proboscis and antennae deep brown; palpi composed of three segments, the apical longest, about as long as the other two, the palpi about one-fifth the length of the proboscis; antennae with long scanty verticillate hairs.

Thorax adorned with narrow-curved bronzy-brown scales, also the scutellum which is deeply trilobed, the mid lobe with four large and two small median border-bristles; metanotum brown, nude.

Abdomen deep brown above, no trace of banding or lateral spots; dull yellowish ventrally, apex bristly; genitalia minute.

Legs deep brown, unbanded, base of femora dull yellowish-brown; ungues apparently all equal and simple.

Wings with rather large fork-cells, the first sub-marginal longer and narrower than the second posterior cell, its base

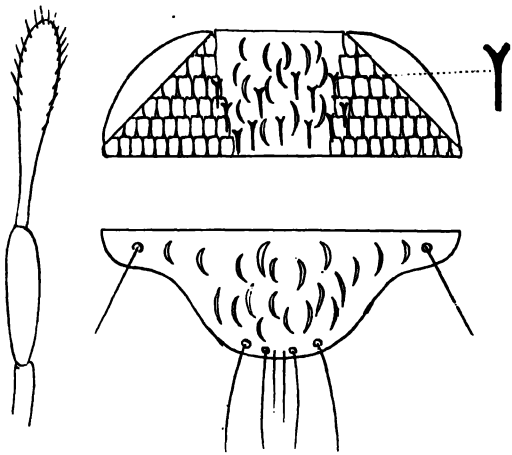


Fig. 289.
Head, scutellum and palp of *Philodendromyia barkerii*. ♂.

slightly nearer the base of the wing than that of the latter, its stem about one-half the length of the cell, stem of the second posterior cell about two-thirds the length of the cell; posterior



Fig. 290.
Wing of *Philodendromyia barkerii*. ♂. n. sp.

cross-vein much longer than the mid, nearly twice its own length distant from it. Wing scales much as in *Dendromyia*.

Length.—3·5 mm.

Habitat.—Sarawak (Dr. A. J. G. Barker).

Time of capture.—July.

Observations.—Described from two ♂'s taken by Dr. Barker in a house. It is an obscure looking insect and can only be identified by the microscopic examination of the scale structure.

Genus **POLYLEPIDOMYIA.** Theobald.

Ann. Mus. Nat. Hung. III., p. 118 (1905).

Head clothed with flat scales over all the front, sides and centre; a small area behind of narrow-curved scales and some upright forked ones. Palpi short but moderately developed in the ♀. Antennae of ♀ pilose, verticillate hairs long. Proboscis moderately long. Thorax clothed with large, narrow-curved scales; prothoracic lobes with small flat scales; scutellum with flat scales; metanotum nude. Apex of abdomen very bristly. Wings with *Culex*-venation and scales.

This genus comes apparently in the *Aedinae*. Both palpi and proboscis show variation in relative lengths in all the specimens examined.

The nearest related genera seem to be *Dendromyia* and *Phoniomyia*, but the absence of metathoracic chaetae and the different wing scales and cephalic ornamentation will at once separate it.

Polylepidomyia argenteiventris. Theobald (1905).

Ann. Mus. Nat. Hung. III., p. 118 (1905).

Head deep brown, dull ochreous in the middle, the sides silvery white. Thorax deep brown clothed with bronzy brown scales; prothoracic lobes white. Abdomen black above, unbanded, venter silvery-white. Legs deep brown, unbanded.

♀. Head deep brown with deep brown flat scales, with ochreous hue in the middle and silvery white at the sides, with some upright forked scales at the back and some small pale narrow-curved ones. Clypeus bright brown; palpi and proboscis deep brown. Antennae deep brown, the basal segment paler, pilose, hairs rather long.

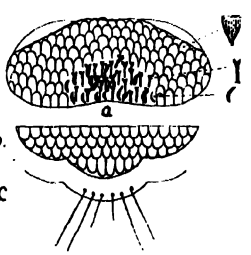


Fig. 291.
Polylepidomyia argenteiventris. Theobald.
a, Head; b, scutellum; c, bristles of lobe.

Thorax deep brown with a dense matting of rather large broad bronzy curved scales, irregularly disposed; prothoracic lobes with small flat silvery scales; scutellum testaceous with flat violet-brown scales and with four large and two small

(central) bristles to the mid lobe; metanotum nude, black; pleurae brown with flat silvery white scales.

Abdomen black, unbanded; venter silvery white; apex bristly.

Legs uniformly brown, with ochreous sheen in certain lights; ungues small, equal, and simple.

Wings with typical brown *Culex* scales; the first submarginal cell longer and very slightly narrower than the second posterior cell, its base a little nearer the base of the wing, its stem about one-third the length of the cell, stem of the



Fig. 292.
Polylepidomyia argenteiventris. Theobald.

second posterior about one-half the length of the cell; posterior cross-vein rather more than three times its own length distant from the mid; the lateral vein scales are rather long, especially on the basal part of the second and fourth veins.

Halteres with testaceous stem and fuscous knob with some pallid scales.

Length.—3·5 to 4 mm.

Habitat.—Paumomu River, New Guinea (Loria, ix.–xii., 1892).

Observations.—Described from five ♀'s. It is easily identified by thoracic scales, black abdomen with silvery venter. It is subject to considerable variation in size, and in apparently the relative length of the palpi and proboscis, also in the relative distance of the posterior cross-vein and mid cross-vein. The type is in the National Museum of Hungary, Budapest.

Sub-Family **LIMATINAE.**

This sub-family contains but one genus which is very marked, namely, *Limatus*, in which the proboscis is curiously jointed and elbowed, a peculiarity seen in no other *Culicine*.

Genus **LIMATUS.** Theobald (1901).

Simondella. Laveran (1902).

Mono. Culicid. II., p. 349 (1901); III., p. 333 (1903), Theobald; Comp. Rend. d. l. Soc. de Biologie, p. 1158 (1902), Simone Laveran.

Limatus durhamii. Theobald (1901).

Simondella curvirostris. Laveran (1902).

Aedeomyia curvirostris. Neveu-Lemaire (1902).

Mono. Culicid. II., p. 349 (1901); III., p. 333 (1903), Theobald; Comp. Rend. d. l. Soc. de Biologie, p. 1158 (1902), Laveran-Simon; Mém. de la Soc. Zool. de France, XV., p. 223 (1902), Neveu-Lemaire; Les Moustiques, p. 429 (1905), Blanchard; Os Mosquitos no Paros, p. 122, pl. V., fig. 20 (1905), Goeldi.

Fresh ♂'s and ♀'s have been received from Professor Goeldi from Para taken in October. Professor Goeldi figures the ♀ with the last hind tarsal white, this only shows when the insect is held in certain directions, and is apparently only on one surface of the segment.

The male fore legs have the last three segments white; the front ungues (attached to white segments) are unequal, one nearly straight, the other curved twice and apparently contorted. The fresh male examined shows the apical proboscis tuft very large, and but a scanty one at the bend. Genitalia very peculiar, the basal lobes are small, and the large claspers terminate in an expanded complex apex, consisting of a large branch terminating in a very small segment (this may be the clasper proper) and a large cup-shaped irregular mass with fimbriated and serrated edges; there is also a prominent curved tuft of golden hairs at the base of the lobes.

Wings with short broad scales; the first sub-marginal much

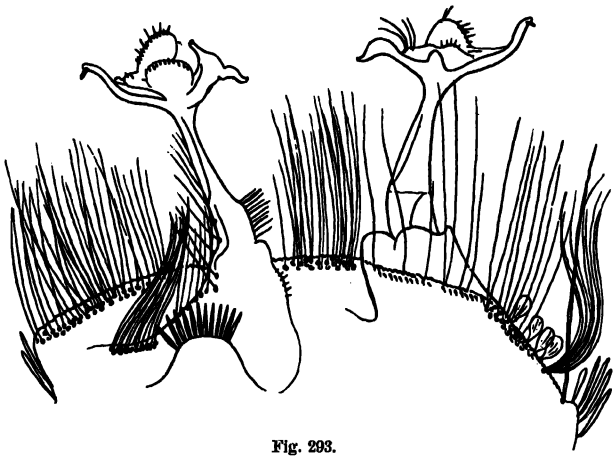


Fig. 293.
Male genitalia of *Limatus durhamii*. Theobald.

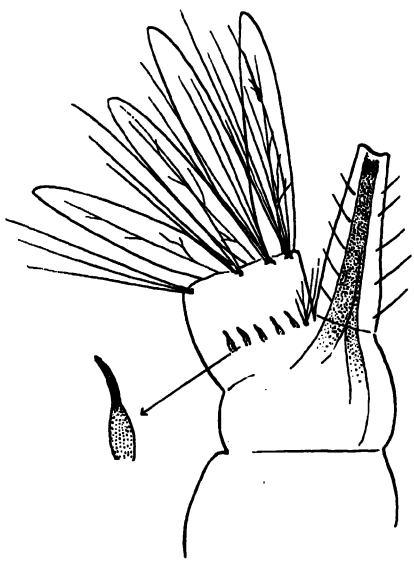


Fig. 294.
Siphon and anal segments of *Limatus durhamii*. Theobald. (After Goeldi.)



Fig. 295.
Labial plate of *Limatus durhamii*. (After Goeldi.)

longer and slightly narrower than the second posterior cell, its base much nearer the base of the wing, its stem rather more than one-third the length of the wing; stem of the second posterior as

long as the cell; posterior cross-vein not so long as the mid and about half its own length distant from it.

Life history.—The life history has been worked out by Professor Goeldi (***Vide Os Mosquitos no Para.*** Plate M).

The larva may be found in the water collected in Bromelias.



Fig. 296.
Pupa of *Limatus durhamii.* Theobald. (After Goeldi.)

It has a short siphon, somewhat contracted apically, with six spines forming a comb on the apical segment, four prominent gill plates; the thorax is relatively small; the antennae composed



Fig. 297.
Larva of *Limatus durhamii.* Theobald. (After Goeldi.)

of a long single segment with a terminal spine and three small thorn-like spines.

ADDENDA.

Dr. Lutz has just sent me the descriptions of the species mentioned below, from *Imprensa Medica*, Brazil, the date of issue is unfortunately omitted, but I believe it is 1906. The papers are entitled 'Entomologia' *Novas especies de Mosquitos do Brasil*, and are numbered as follows:—

Sp. I. *Culex spinosus*. Lutz. I. Med., p. 26; Mono. Culicid. iv., p. 455.

Sp. IX. *Carrollia irridescens*. Lutz. I. Med., p. (?); Mono. Culicid., pp. 206 and 207.

Sp. X. *Stegoconops capricorni*. Lutz. I. Mod., p. (?); Mono. Culicid. iv., p. 551.

This Dr. Lutz and self agreed to place in *Haemagogus*.

Sp. XI. *Stegoconops leucomelas*. I. Med., p. (?); Mono. Culicid. iv., p. 551.

Also a *Haemagogus*.

Sp. XIV. *Hyloconops longipalpis*. Lutz. I. Med., p. (?); Mono. Culicid. iv., p. 588.

Sp. XVI. *Trichoprosopon compressum*. Lutz. I. Med., p. (?); Mono. Culicid. iv., p. 590.

Sp. XVIII. *Sabethes albiprivatus*. Lutz. I. Med., p. (?); Mono. Culicid. iv., p. 595.

Sp. XXII. *Dendromyia serrata*. Lutz. I. Med., p. 287; Mono. Culicid. iv., p. 615.

Sp. XXVII. *Sabethinus intermedius*. Lutz. I. Med., p. 348; Mono. Culicid. iv., p. 619.

Sp. XXVIII. *Sabethinus aurescens*. Lutz. I. Med., p. 350; Mono. Culicid. iv., p. 622.

Several other new species are also described in this Journal, which must be included in another volume.

INDEX.

A.

Acartomyia, 21, 150
Aedeomyia, 21, 537
Aedeomyia curvirostris, 627
Aedeomyinae, 8, 18
Aedes, 12, 21, **537**
Aedes cinereus, **539**
Aedes fuscus, **538**
Aedes nigrescens, **540**
Aedes rufus, 539
Aedes smithii, 608
Aedes splendens, 550
Aedimorphus, 20, 148, **199**
Aedimorphus alboannulatus, **199**
Aedinae, 18, 23, **537**
Aldrichia, 20
Anisocheleomyia, 21, **570**
Anisocheleomyia (?) albitarsis, **576**
Anisocheleomyia alboannulata, **573**
Anisocheleomyia leucoptera, **575**
Anisocheleomyia nivipes, **571**
Ankylorhyninae, 19, 20
Ankylorhynchae, 126
Ankylorhynchus, 20, **127**
Ankylorhynchus neglectus, **127**
Ankylorhynchus trichopygus, 127
Ankylorhynchus violaceus, 127
Anophelinae, 7, 18; comb of larva, 6; larval characters of, 5
Anophelines, larval characters of, 5; as agents of infection, 3
Anopheles, 11, 20, 22
Anopheles aitkenii, 24
Anopheles albipes, 106
Anopheles alboannulatus, 86
Anopheles algeriensis, 24
Anopheles annulimanus, 26
Anopheles annulipalpis, 125
Anopheles annulipes, 4, 97
Anopheles barberi, 7, 24, **37**
Anopheles barbirostris, 82
Anopheles bifurcatus, 3, 24, 26, **36**
Anopheles brachypus, 126
Anopheles christophersi, 51
Anopheles claviger, 26, 36
Anopheles corethroides, 24, **35**
Anopheles costalis, 74
Anopheles cubensis, 106
Anopheles culicifacies, 52, 51
Anopheles crucians, 7, 24, **29**
Anopheles deceptor, 125
Anopheles eiseni, **38**
Anopheles elegans, 77
Anopheles farauti, 125
Anopheles ferrugineus, 24, **40**
Anopheles fluviatilis, 51
Anopheles franciscanus, 7, 24, **31**
Anopheles fuliginosus, 99
Anopheles funesta, 46
Anopheles gambiae, 74
Anopheles gigas, 24, **31**
Anopheles gracilis, 74
Anopheles hebes,
Anopheles immaculatus, 24, **40**
Anopheles jamesii, 99
Anopheles jesoensis, 86
Anopheles karwari, 98
Anopheles kumasii, 46
Anopheles leucopsis, 99
Anopheles leucosphyrus, 77
Anopheles lindsayi, 24, **40**
Anopheles listoni, 51
Anopheles maculatus, 97
Anopheles maculicosta, 126
Anopheles maculipalpis, 98
Anopheles maculipennis, 3, 4, 7, 24, **26**
Anopheles martini, 3, **125**
Anopheles mauritianus, **88**
Anopheles minimus, 126
Anopheles multicolor, 126
Anopheles musicus, 97

NOTE.—The black figures refer to the descriptions of the genera and species.

Anopheles musivus, 97
Anopheles nigerrimus, 87
Anopheles nigripes, 24, **40**
Anopheles paludis, var. similis, 88
Anopheles pharoensis, 106
Anopheles pictus, 87, **124**
Anopheles pulcherrimus, 29, 110
Anopheles punctipennis, 7, 24, **27**
Anopheles punctulatus, **109**
Anopheles pursati, 3, **125**
Anopheles pseudopictus, 87
Anopheles pseudopunctipennis,
Anopheles quadrimaculatus, 24, 26
Anopheles rossii, 47
Anopheles sinensis, 86
Anopheles smithii, 24, **38**
Anopheles squamosus, 110
Anopheles tarsimaculatus, 106
Anopheles tenebrosus, 88
Anopheles theobaldi, 98
Anopheles trifurcatus, 36
Anopheles turkhudi, 52
Anopheles vagus, 47
Anopheles vincenti, 3, **125**
Anopheles villosus, 36
Anopheles walkeri, 36
Anopheles wellcomei, 24, **33**
Anopheles willmori, 97
Aporoculex, 12, 21, **316**
Aporoculex punctipes, **316**
Arribalzagia, 23

B.

Bamboos, as breeding places of mosquitoes, 2
Bancroftia, 20, 152, **521**
Bancroftia albicosta, **521**
Banksinella, **468**
Banksinella luteolateralis, **469**
Banksinella luteolateralis, var. albothorax, **470**
Banksinella luteolateralis, var. pallida, **470**
Binotia, 585
Birónella, 20, 22, 24, **120**
Birónella gracilis, **121**
Breeding places of mosquitoes, 2
Bromelias, as breeding places of mosquitoes, 2

C.

Cacomyia, 21, 537, 550, **554**
Cacomyia albomaculata, 554
Cacomyia equina, **554**
Caelodiazesis, 14
Carrollia, 21, 141, **206**
Carrollia irridescens, **207**
Catageiomyia, 21, 149
Cellia, 20, 23, **104**
Cellia albimana, 3, 7, 105, **106**
Cellia albipes, 3, 7, 106
Cellia argyrotarsis, 3, 105
Cellia bigotii, 105
Cellia cubensis, 106
Cellia kochii, 105, **110**
Cellia pharoensis, 105, **106**
Cellia pulcherrima, 105, **110**
Cellia punctulata, **109**
Cellia squamosa, 105, **110**
Chagasia, 20, 24, **122**
Chagasia fajardoi, **123**
Chagasia nivae, 123
Characters of sub-families, 18
Christya, 20, 23, **89**
Christya implexa, **89**
Chrysoconops, 9, 21, 151, 483, **491**
Chrysoconops aurites, **492**
Chrysoconops brevicellulus, **492**
Chrysoconops cristatus, **491**
Chrysoconops fulvus, **493**
Chrysoconops fuscopennatus, **492**
Chrystya, 89
Classification, new methods of, 9
Coquillett's, 14; Lutz's, 15
Corethra, separation of, from Culicidae, 15
Corethridae, 15
Coquillett's classification, 14
Coquillettidia, 12, 494
Culicada, 10, 21, 151, **318**
Culicada abfitchii, 7, 319, **328**
Culicada aberrata, 320, **364**
Culicada arcanus, 320
Culicada aurifer, 320, **351**
Culicada bicolor, 320, 347
Culicada bupengaryensis, 320, **348**
Culicada cantans, 319
Culicada cantator, 319, **334**
Culicada canadensis, 320, **341**
Culicada cinereoborealis, 320, **367**
Culicada diversa, 320, **359**
Culicada dupreei, 466
Culicada fitchii, 7, 319, **321**
Culicada fluviatilis, 320, **342**
Culicada lazarensis, 320, **360**
Culicada lutescens, 320, **344**
Culicada minuta, 320, **338**
Culicada nemorosa, 321, **370**
Culicada nipponii, 319, **337**
Culicada onondagensis, 320, **340**
Culicada pretans, 320, **353**
Culicada pullata, 4
Culicada punctor, **371**
Culicada quasimodesta, 320, **345**

Culicada siphonalis, **330**
Culicada subcantans, 319, **324**
Culicada squamiger, 501
Culicada trichura, 320, **357**
Culicada trivittata, 224
Culicada vittata, 7
Culicada waterhousei, 319, **332**
Culicella, 10, **471**
Culicella dyari, 6
Culicella melanurus, 6
Culicelsa, 9, 21, 151, **377**
Culicelsa aurifer, 351
Culicelsa alboannulata, **382**
Culicelsa annulirostris, 302
Culicelsa auroides, **380**
Culicelsa taeniorhynchus, **377**
Culicelsa togoi, **379**
Culicelsa vigilax, **382**
Culicelsa pseudovigilax, **382**
Culicinae, 9, 18, 147; larval characters, 5, 6
Culiciomyia, 149, **227**
Culiciomyia annulata, 227, **230**
Culiciomyia ceylonica, 227, **236**
Culiciomyia freetownensis, 227, **234**
Culiciomyia inornata, **227**
Culiciomyia minutissima, **235**
Culiciomyia pulla, 227, **232**
Culiseta, 10, 21, **383**
Culiseta absobrina, **383**
Cycloleppteron, 20, 22, **54**
Cycloleppteron grabhamii, 55
Culex, 12, 21, 151, **387**
Culex abfitchii, 7, 328
Culex abserratus, 4, 364
Culex absobrinus, 383
Culex affinis, 277
Culex albipes, **406**
Culex albitarsis, 158, 283
Culex alboannulatus, 382
Culex albopictus, 179
Culex albopleura, **456**
Culex alternans, 162
Culex annulatus, 277
Culex annuliferus, 388
Culex annulirostris, 4, 382
Culex annulitarsis, 176
Culex apicalis, **452**
Culex (?) atropalpus, **401**
Culex aurifer, 351
Culex bancroftii, 176
Culex bicolor, 347
Culex bifoliata, **425**
Culex birói, 390
Culex boscii, 159
Culex bostockii, **444**
Culex caecus, 268
Culex calopus, 176
Culex canadensis, 341
Culex cantator, 334
Culex christophersii, **453**
Culex ciliatus, 159
Culex cilipes, 162
Culex cinereoborealis, 367
Culex commovens, 162
Culex confinnis, 286
Culex conterrens, 159
Culex corniger, **415**
Culex cyaneus, 550
Culex damnosus, 494
Culex dentatus, **436**
Culex discolor, 309
Culex diversus, 359
Culex dupreci, 466
Culex dyari, **412**, 471
Culex elegans, 176
Culex excitans, 176
Culex fasciatus, 176, 370
Culex fatigans, 3, 4
Culex fitchii, 321
Culex flavifrons, 304
Culex flavoscens, 344
Culex flavicosta, 493
Culex fluviatilis, 342
Culex formosus, 176
Culex fragilis, **424**
Culex frater, 176
Culex freetownensis, 234
Culex fulvus, 493
Culex fuscocephala, **420**
Culex gelidus, 372
Culex guiarti, **433**
Culex guttatus, 370
Culex hirsutipalpis, **395**
Culex hispidosus, 162
Culex impatibilis, 176
Culex incidens, 279
Culex inconspicuus, **438**
Culex inexorabilis, 176
Culex jamaicensis, 286
Culex janitor, **453**
Culex kelloggii, **391**
Culex konoupi, 176
Culex lateropunctata, **458**
Culex lazarensis, 360
Culex leucacanthus, 307
Culex luteolateralis, 469
Culex lutescens, 344
Culex marinus, 382
Culex melanurus, 471, 510
Culex microannulatus, 4
Culex minutus, **445**
Culex molestus, 159
Culex mosquito, 176
Culex nanus, 288
Culex neavei, **429**
Culex neglectus, **459**
Culex nemorosus, 370
Culex nigrithorax, 4
Culex niveitarsis, **408**

Culex notoscripta, 198
Culex obturbans, 163
Culex onondagenensis, 340
Culex osakaensis, **439**
Culex pallidocephala, **434**
Culex pallidostriatus, **410**
Culex pallidothorax, **446**
Culex palus, **456**
Culex particeps, 279
Culex ochripes, 493
Culex perterrens, 159
Culex pretans, 353
Culex provocans, 370
Culex quasimodestus, 345
Culex quasisecutor, **398**
Culex pipiens, 6
Culex procax, 4
Culex pseudomelanoconia, **416**
Culex pulchritarsis, 301
Culex pullus, 232
Culex punctor, 364
Culex quasilineatis, **415**
Culex regius, 141
Culex reptans, 370
Culex restuans, 6, **417**
Culex rima, 514
Culex rossii, 176
Culex rubidus, 189
Culex rubinotus, **431**
Culex salinarius, 6, **421**
Culex salinus, 370
Culex salisburiensis, **453**
Culex scutellaris, 179
Culex secutor, 6, **397**
Culex serratus, 464
Culex signifer, 524
Culex similis, **448**
Culex simpsoni, **441**
Culex siphonalis, 328, 330
Culex sollicitans, 291, 494
Culex spinosus, **455**
Culex squamifer, 501
Culex squamiger, 501
Culex stenoetrus, **395**
Culex stoehri, **419**
Culex stricticus, 370
Culex subfuscus, **403**
Culex sugens, 199
Culex sylvaticus, 370
Culex sylvestris, **405**
Culex taeniatus, 176
Culex taeniorhynchus, 291, 377, 494
Culex tarsalis, 6, **395**
Culex territans, 6, **448**
Culex titillans, 494
Culex tortilis, **428**
Culex trichurus, 357
Culex trimaculatus, **427**
Culex triseriatus, 254
Culex trivittatus, 224
Culex variegatus, 179, 277
Culex ventralis, 163
Culex vigilax, 4, 382
Culex viridifrons, 176
Culex viridis, 433
Culex vishnui, 387
Culex vittatus, 191 (?)
Culex waterhousei, 332
Culex zonatipes, 176

D.

Danielsia, 149, **240**
Danielsia albotaeniata, 240, **241**
Danielsia mediomaculata, 240, **245**
Danielsia nigrescens, 240, **248**
Danielsia tripunctata, 242, **247**
Danielsia wellmanii, 242, **244**
Deinoceratinae, 18, 19, 20
Deinocerites, 12
Dendromyia, 8, 22, 584, **603**
Dendromyia asullepta, 604
Dendromyia mitchellii, 604, **605**
Dendromyia oblita, 604, 612
Dendromyia paraensis, 604, 613
Dendromyia personata, 604
Dendromyia quasiluteoventralis, 604, **607**
Dendromyia scintillans, **604**
Dendromyia serrata, 604, **615**
Dendromyia smithii, 3, 604, **608**
Dendromyinae, 18, 20, 22, 583, **594**
Dengue, 4
Desvoidea, 21, 148
Desvoidea fusca, 163, **165**
Desvoidea joloensis, 163, **165**
Desvoidea obturbans, 2, **163**
Desvoidea panalectros, 163
Disease carriers, 3
Duckweeds as a preventive against mosquitoes, 1

E.

Ecculex, 10, 12, **460**
Eretmapodites, 20, 148
Etorleptiomyia, 21, 151, **505**
Etorleptiomyia luzonensis, **506**
Etorleptiomyia mediopunctata, **506**

F.

Feltidia, 12, 22, 284
Feltinella, 20, 22, **56**
Feltinella pallidopalpi, 57

Ficalbia, **577**
Ficalbia minima, 577
Ficalbia nigripes, 577, **578**
Ficalbia simplex, 577
Filariasis carrier, 3
Finlaya, 21, 152, **520**
Finlaya poicilia, **520**

G.

Genitalia, male, 7
Gilesia, 150
Gnophodeomyia, 149, **251**
Gnophodeomyia inornata, **252**
Goeldia, 584
Grabhamia, 12, 21, 150, **284**
Grabhamia ambigua, 285
Grabhamia curriei, 285
Grabhamia de niedmannii, 501
Grabhamia discolor, 285, **309**
Grabhamia dorsalis, 285
Grabhamia durbanensis, 205
Grabhamia flavifrons, 205, **304**
Grabhamia jamaicensis, 7, 285, **286**
Grabhamia longisquamosa, 285, **303**
Grabhamia maculosa, 285, **312**
Grabhamia mariae, 285
Grabhamia ochracea, 285, **300**
Grabhamia penicillaris, 285
Grabhamia pulcripalpis, 285
Grabhamia pulcritarsis, 285, 301
Grabhamia pygmaea, 285, **289**
Grabhamia sollicitans, 285, **291**
Grabhamia spenceri, 285
Grabhamia subtilis, 285, **294**
Grabhamia taeniorostris, 285, **299**
Grabhamia willcocksii, 285, **296**
Grabhamia vittata, 285, **308**
Grassia, 41
Gualteria, 21, 537, 550, **552**
Gualteria fulvithorax, **552**
Gualteria oswaldi, **552**
Gymnometopa, 21, **209**
Gymnometopa albonotata, 210, **211**
Gymnometopa buskii, 210, **211**
Gymnometopa mediovittata, **210**
Gymnometopa sexlineata, 210

H.

Haemagoginae, 550
Haemagogus, 21, 537, **550**
Haemagogus capricornii, **551**
Haemagogus cyaneus, **550**, 551
Haemagogus leucomelas, **551**
Haemagogus splendens, 550
Helicornia brasiliensis, as a breeding place of mosquitoes, 2
Heptaphlebomyinae, 18, 19, 21, **531**
Heptaphlebomyia, **531**
Heptaphlebomyia argenteopunctata, **534**
Heptaphlebomyia montforti, **536**
Heptaphlebomyia simplex, **531**
Hermaphroditism, in Culicidae, 4
Hodgesia, **579**
Hodgesia sanguinae, **579**
Howardia, 63
Howardina, 21, 149, **214**
Howardina aurites, 214, **216**
Howardina chrysolineata, **218**
Howardina greenii, 214
Howardina walkeri, 214, **215**
Hulecoeteomyia, 21, 149, **219**
Hulecoeteomyia pseudotaeniata, **222**
Hulecoeteomyia trilineata, **220**
Hyloconopinae, 20, 21, 583, 584, 585
Hyloconops, 21, 584, **586**
Hyloconops longipalpis, **588**
Hyloconops pallidiventer, **587**

J.

Janthinosoma, 12, 20, 148, **152**
Janthinosoma albipes, 153, **157**
Janthinosoma arribalzagae, 158
Janthinosoma coquillettii, 153
Janthinosoma discrucians, 153, 157
Janthinosoma jamaicensis, 157
Janthinosoma johnstonii, 154
Janthinosoma lutzii, 153, **156**
Janthinosoma mexicana, 155
Janthinosoma musica, 7, 152, 155
Janthinosoma posticata, 153, **154**, 155
Janthinosoma sayi, 152, **155**
Janthinosoma terminalis, 153, 154
Janthinosoma varipes, 153, **154**
Joblotia, 584, 590, **592**
Joblotia lunata, **594**
Joblotia nivipes, 593
Joblotinae, 20, 21, 585

K.

Kertészia, 20, 23, **117**
Kertészia boliviensis, **118**

L.

Larval characters, 5
Lasioconops, 21, 152
Laverania, 95

Leicesteria, 21, 148, **201**
Leicesteria longipalpis, **201**
Lemna minor, as a preventive against mosquitoes, 1
Lepidoplatys, 21, 151, **501**
Lepidoplatys squamiger, **501**
Lepidotomyia, 149, **249**
Lepidotomyia magna, **250**
Leptosomatomyia, 21, 537, **548**
Leptosomatomyia lateralis, **548**
Leucomyia, 21, 151, **372**
Leucomyia gelida, **372**
Leucomyia gelida, var. cuncata, 372
Leucomyia gelida, var. bipunctata, 372
Leucomyia plegepennis, 375
Limatinae, 18, 20, 22
Limatus, 22, **627**
Limatus durhamii, **627**
Lobster Claw Plant, as a breeding place of Mosquitoes, 2
Lophomyia 91
Lophoceratomyia, 151, **471**
Lophoceratomyia brevipalpus, **477**
Lophoceratomyia fraudatrix, **474**
Lophoceratomyia uniformis, **473**
Lophoscelomyia, 20, 23, **91**
Lophoscelomyia asiatica, **92**
Ludlowia, 21, 148, **193**
Ludlowia chamberlani, **194**
Ludlowia sudanensis, **195**
Lutzia, 21, 151
Lutz's general classification, 15
Lynchiella, 128
Lynchinellinae, 19, 126

M.

Macleaya. 21, 148, **203**
Macleaya tremula, **204**
Maillotia, 21, 150, **274**
Maillotia pilifera, **274**
Male genitalia, 7; formation of genera by, 11
Mansonia, 21, 151, **494**
Mansonia annulifera, **496**
Mansonia nigra, **496**
Mansonia seguini, **496**
Mansonia septempunctata, **494**
Mansonia titillans, 494
Mansonia uniformis, 3, **496**
Mansonioides, 21, 151, **498**
Mansonioides septemguttata, **499**
Megaculex, 21, 150, **282**
Megaculex albitarsis, **283**
Megarhininae, 18, 19, **126**
Megarhinus, 12, 20, 126, 128
Megarhinus chrysocephalus, 129, **136**
Megarhinus dowaldi, 129, 139
Megarhinus ferox, 128, **129**
Megarhinus gilesii, 141
Megarhinus grandiosus, 129
Megarhinus herrickii, 129, **131**
Megarhinus haemorhoidalis, 129
Megarhinus longipes, 128
Megarhinus lutescens, 129
Megarhinus mariae, **129**
Megarhinus mininus, 128, 138
Megarhinus portoricensis, 129
Megarhinus separatus, **129**
Megarhinus solstitialis, 129, **133**
Megarhinus splendens, 129
Megarhinus subulifer, 141
Megarhinus waldi, 139
Melanoconion, 12, 21, 151, **509**
Melanoconion annulipes, **512**
Melanoconion melanurus, **510**
Melanoconion ornatus, **508**
Melanoconion pallidiceps, **509**
Melanoconion rima, 514
Metanotopsilae micropalpae, 537
Microculex, 21, 151, **461**
Microculex argenteoumbrosa, **461**
Mimomyia, 21, **581**
Mimomyia uniformis, **581**
Mimomyia splendens, **583**
Mochlonyx, separation from Culicidae, 15
Mucidus, 20, 148, **162**
Mucidus africanus, **162**
Mucidus alternans, 4, **162**
Myzomyia, 20, 22
Myzomyia aconita, 41
Myzomyia albirostris, 41
Myzomyia christophersi, **51**
Myzomyia culicifacies, 3, 41, **51**
Myzomyia elegans, 41
Myzomyia funesta, 3, 4, 41, **46**
Myzomyia hebes, 41
Myzomyia hispaniola, 41
Myzomyia indefinata, 41, **47**
Myzomyia kumasii, 41
Myzomyia leptomeres, 41
Myzomyia leucosphyrus, 41
Myzomyia listoni, 3, 41
Myzomyia longipalpis, 41
Myzomyia ludlowii, 41, **47**
Myzomyia lutzii, 41
Myzomyia nili, 41, **43**
Myzomyia punctulata, 109
Myzomyia pyretophoroides, 41, **48**
Myzomyia rhodesiensis, 41
Myzomyia rossii, 3, 41, **47**
Myzomyia superpicta, 3
Myzomyia tessellata, 41
Myzomyia thorntonii, 41, **53**
Myzomyia turkhudi, 41, **52**
Myzorhynchella, 20, 23, **76**

Myzorhynchella nigra, **78**
Myzorhynchus, 20, 23, **80**
Myzorhynchus albotaeniatus, 81, **86**
Myzorhynchus bancroftii, 81
Myzorhynchus barbirostris, 3, 81, **82**
Myzorhynchus coustani, 3, 81, **89**
Myzorhynchus mauritianus, 81, **88**
Myzorhynchus minutus, 3, 81, **87**
Myzorhynchus nigerrimus, 3, 81, 87
Myzorhynchus paludis, 3, 81, **88**
Myzorhynchus plumiger, 81
Myzorhynchus pseudobarbirostris, 81, **83**
Myzorhynchus pseudopictus, 3, 81, **89**
Myzorhynchus sinensis, 81, **86**
Myzorhynchus strachanii, 81, **85**
Myzorhynchus umbrosus, 81, 85
Myzorhynchus vanus, 81
Myzorhynchus ziemani, 81, **88**

N.

Neocellia, 20, 23, **111**
Neocellia dudgeonii, 111, **113**
Neocellia indica, **111**
Neocellia intermedia, 111, **115**
Neoculex, 12
Neomacleaya, 21, 149, **238**
Neomacleaya indica, **238**
Neomelanoconion, 151, **514**
Neomelanoconion rima, **514**
New methods of classification, 9
Notonotricha, 54
Nototricha, 54
Nyssorhynchus, 20, 23, **95**
Nyssorhynchus annulipes, 96, **97**
Nyssorhynchus fuliginosus, 95, **99**
Nyssorhynchus indiensis, **98**
Nyssorhynchus jamesii, 96
Nyssorhynchus karwari, 95, **98**
Nyssorhynchus maculatus, 95, **97**
Nyssorhynchus maculipalpis, 95
Nyssorhynchus masteri, 96
Nyssorhynchus metaboles, 95
Nyssorhynchus nivipes, 96, **101**
Nyssorhynchus philippinensis, 96, **103**
Nyssorhynchus pretoriensis, 95
Nyssorhynchus stephensi, 95, **96**
Nyssorhynchus theobaldi, 3, 95, **98**
Nyssorhynchus willmori, 95, **97**

O.

Ochlerotatus triseriatus, 254
Ochlerotatus trivittatus, 224
Oculeomyia, 21, 152, **515**
Oculeomyia sarawaki, 515
O'Reillia, 505
O'Reillia luzonensis, 506
Orthopodomyia, 21, **527**
Orthopodomyia albipes, **527**
Orthorhynchae, metanotopsilae-heteropalpae, 147

P.

Panoplites, 494
Panoplites africana, 496
Panoplites australiensis, 496
Panoplites uniformis, 496
Panoplites seguini, 496
Pardomyia, 21, 150, **280**
Pardomyia aurantia, **280**
Pecomyia, 21, 149, **265**
Pecomyia caeca, 268
Pecomyia maculata, **266**
Phagomyia, 21, 149, **223**
Phagomyia gubernatoris, 223
Phagomyia irritans, 223
Phagomyia (?) nigricephala, 223
Philodendromyia, 22, **623**
Philodendromyia barkeri, **623**
Phoniomyia, 22, 584, **598**
Phoniomyia bimaculipes, 598, **600**
Phoniomyia indica, 598, **601**
Phoniomyia longirostris, 598
Phoniomyia magna, 598, **602**
Phoniomyia pallidoventer, **598**
Phoniomyia quasilongirostris, **598**
Pneumaculex, 12, 152, **523**
Pneumaculex signifer, **524**
Polylepidomyia, 22, **625**
Polylepidomyia argenteiventris, **625**
Polyleptiomyia, 21, 149, **223**
Polyleptiomyia albocephala, 223
Popea, 21, 149, **211**
Popea lutea, **212**
Protoculex, 11, 12, 21, 151, **463**
Protoculex dupreei, **466**
Protoculex quasisecutor, **465**
Protoculex secutor, **464**
Protomacleaya, 21, 149, **253**
Protomacleaya triseriata, **254**
Pseudograbhamia, 21, 150, **314**
Pseudograbhamia maculata, **314**
Pseudohowardina, 21, 149, **223**
Pseudohowardina trivittata, **224**
Pseudoskusea, 21, 148, **192**
Pseudoskusea multiplex, **192**
Pseudotheobaldia, 21, **271**
Pseudotheobaldia niveitaeniata, **272**
Pseudouranotaenia, 21, **566**
Pseudouranotaenia rowlandii, **567**
Psorophora, 12, 20, 148, **158**

Psorophora ciliata, 159
Psorophora cilipes, 162
Psorophora fulvus, 498
Psorophora howardii, 162
Psorophora scintillans, 162
Pyretophorus, 22, **63**
Pyretophorus atratipes, 64
Pyretophorus ardensis, 3, 64, **75**
Pyretophorus aureosquamiger, 64, **73**
Pyretophorus austenii, 64, **71**
Pyretophorus cinereus, 64
Pyretophorus costalis, 3, 63, **74**
Pyretophorus chaudoyei, 64
Pyretophorus elegans, 64, **77**
Pyretophorus fajardi, 123
Pyretophorus fajardoi, 123
Pyretophorus gambiae, 63
Pyretophorus gracilis, 63
Pyretophorus jeyporensis, 64, 70
Pyretophorus nigrifasciatus, 64, **65**
Pyretophorus nursei, 64, **65**
Pyretophorus marshallii, 64
Pyretophorus merus, 64
Pyretophorus minimus, 64
Pyretophorus myzomyfacies, 64, **69**
Pyretophorus pitchfordii, 3, **72**
Pyretophorus palestinensis, 64
Pyretophorus philippinensis, 103
Pyretophorus sergentii, 64, **68**
Pyretophorus superpictus, 64

Q.

Quasistegomyia, 21, 148, **165**
Quasistegomyia gardneri, **168**
Quasistegomyia unilineata, **165**

R.

Rachionotomyia, 21, 152, **518**
Rachionotomyia ceylonensis, **518**
Reedomyia, 149, **257**
Reedomyia albopunctata, 258, **262**
Reedomyia alboscutella, 258, **261**
Reedomyia biannulata, 258, **263**
Reedomyia niveoscutella, 258, **259**
Reedomyia pampangensis, **258**
Rossia, 80
Runchomyia, 21, 584, **585**
Runchomyia frontosa, **585**

S.

Sabethes, 22, 584, **594**
Sabethes albiprivatus, 594, **595**
Sabethes longipes, 594
Sabethes lutzii, 594
Sabethes nitidus, 594
Sabethes remipes, 594
Sabethoides, 22, 584, **617**
Sabethoides purpureus, **617**
Sabethinus, 22, 584, **618**
Sabethinus albiprivatus, 618, **620**
Sabethinus aurescens, 618, **622**
Sabethinus intermedius, 618, **619**
Sabettinae, 583, **594**
Sabettoides, 617
Sabettus, 594.
Scutomyia, 21, 148, **196**
Scutomyia albolineata, 196, **197**
Scutomyia marshallii, 196, 197
Scutomyia nivea, 196, 197, **198**
Scutomyia notoscripta, 4, 196
Scutomyia sugens, 196, 197, **199**
Simondella, 627
Simondella curvirostris, 627
Skusea, 21, 537, 542
Skusea culiciformis, 542, **546**
Skusea diurna, 542, **547**
Skusea funerea, 542
Skusea funerea, var. ornata, **542**
Skusea mediofasciata, 542, **544**
Stegomyia, 12, 21, 148, **170**
Stegomyia africana, 170, 172, **185**
Stegomyia amesii, 171, 173, **191**
Stegomyia annulirostris, 171, **173**
Stegomyia argenteomaculata, 172, **184**
Stegomyia argenteopunctata, 171, 172
Stegomyia (?) brevipalpis, 171
Stegomyia buskii, 211
Stegomyia crassipes, 170, 173
Stegomyia fasciata, 3, 4, 170, 171, **176**
Stegomyia grantii, 170, 172
Stegomyia mediopunctata, 171, 172, **187**
Stegomyia mediovittata, 210
Stegomyia minuta, 172
Stegomyia nigeria, 170
Stegomyia periskeleta, 171
Stegomyia poweri, 171, 172, **185**
Stegomyia pseudonivea, 171, 172, **188**
Stegomyia pseudotaeniata, 222
Stegomyia punctolateralis, 170, 172, **189**
Stegomyia scutellaris, 2, 4, 170, 171, **179**
Stegomyia scutellaris, var. samarensis, **179**
Stegomyia signifer, 524
Stegomyia simpsoni, 171, 172, **182**
Stegomyia thomsoni, 170
Stegomyia W-alba, 171, 174, **180**

Stegomyia (Culex) walkeri, 215
Stethomyia, 20, 22, **59**
Stethomyia culiciformis, 59, **62**
Stethomyia fragilis, 59, **60**
Stethomyia nimba, 59
Stethomyia pallida, 59, **61**
Sub-families of Culicidae, table and characters of, 18

T.

Table of sub-families, 18
Taeniorhynchus, 8, 21, 151, **483**, 494
Taeniorhynchus ager, 483
Taeniorhynchus antiguae, 289
Taeniorhynchus arribalzagae, 483
Taeniorhynchus argenteus, 483, **486**
Taeniorhynchus aurites, 493
Taeniorhynchus brevicellulus, 492
Taeniorhynchus confinnis, 483, 494
Taeniorhyuchus cristatus, 491
Taeniorhynchus fasciolatus, 483, 494
Taeniorhynchus fulvus, 493
Taeniorhynchus fuscopennatus, 492
Taeniorhynchus lineatopennis, **489**
Taeniorhynchus perturbans, 483, **486**
Taeniorhynchus richardii, 483
Taeniorhynchus tenax, 483, **486**
Taeniorhynchus walsinghamii, 483, **484**
Theobaldia, 21, 150, **275**
Theobaldia annulata, **277**
Theobaldia incidens, **279**
Theobaldia spathipalpis, **276**
Theobaldinella, 12, 275
Theobaldinella annulata, 277
Theobaldinella incidens, 279
Toxorhynchites, 20, **140**, 147
Toxorhynchites immesericors, **141**
Toxorhynchites leicesterii, **142**
Toxorhynchites metallicus, 144
Trichopronomyia, 21, 151, **479**
Trichopronomyia annulata, **479**
Trichopronomyia microannulata, **481**
Trichorhynchus, 21, 127, 150, **270**
Trichorhynchus fuscus, **270**
Trichoprosoponinae, 18, 583, **585**
Trichoprosopon, 21, 584, **590**
Trichoprosopon compressum, **590**
Trichoprosopon lunata, 594
Trichoprosopon nivipes, **593**

U.

Uranotaenia, 11, 21, **556**
Uranotaenia alba, 557
Uranotaenia annulata, 557
Uranotaenia apicalis, 557
Uranotaenia atra, 557, **563**
Uranotaenia balfouri, 557, **561**
Uranotaenia caeruleocephala, 557
Uranotaenia fusca, 557, **564**
Uranotaenia (?) geometrica, **565**
Uranotaenia lowii, 557, **560**
Uranotaenia malayi, 557
Uranotaenia minuta, 557, **559**
Uranotaenia nataliae, 557
Uranotaenia pallidoventer, 557
Uranotaenia pulcherrima, 556, **557**
Uranotaenia sapphirina, **557**
Uranotaenia socialis, 557
Uranotaenia testacea, 557, **560**
Uranotaeninae, 18, 19, 21, **556**

W.

Wyeomyia, 11, 22, 584, **596**
Wyeomyia greenii, **596**
Wyeomyia (?) leucostigma, **597**
Wyeomyia smithii, 608

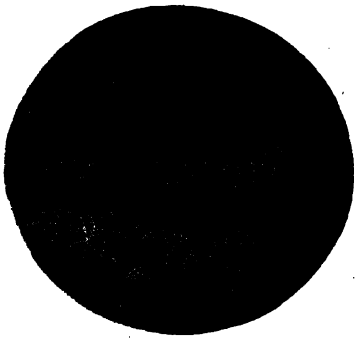
Y.

Yellow fever carrier, 3



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Plate I.



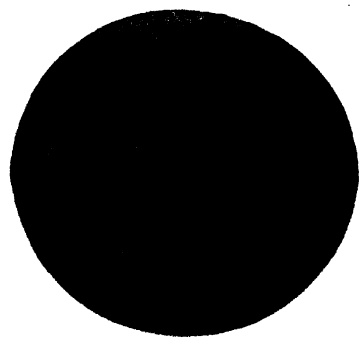
Feltinella pallidopalpi. (♀). n. sp.



Myzorhynchella nigra. (♀). n. sp.



Quasistegomyia unilineata. (♀). Theob.



Howardina aurites. (♀). n.sp.



Howardina chrysolineata. (♀). n. sp.



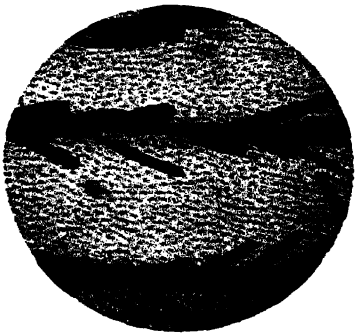
Pneumaculex signifer. (♀). Coq.

Wing Scales.

Plate II.



Carrollia irridescens. (♀). Lutz.

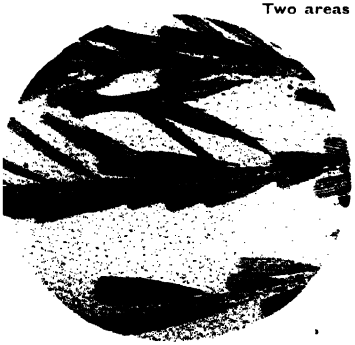


Pecomyia caeca. (♀). Theob.





Pecomyia maculosa. (♀). n. sp.
Two areas of wing field.



Protomacleaya triseriata. (♀). Say.



Gnophodeomyia inornata. (♀). Theob.

Wing Scales.

Plate III.



Culiciomyia freetownensis. (♀). Theob.



Culiciomyia annulata. (♀). n. sp.



Culicada abserrata. (♀). Felt.



Culicada aurifer. (♀). Coq.



Culicada abfitchii. (♀). Felt.



Culicada fluviatilis. (♀). Lutz.

Wing Scales.

Plate IV.



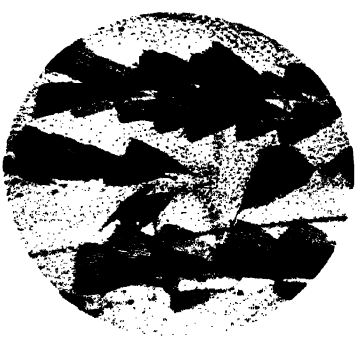
Culicada fitchii. (♀). Felt.



Grabhamia pulcritarsis. (♀. Rond.



Grabhamia subtilis. (♀. Sergent.



Lepidoplatys squamiger. (♀). Coq.



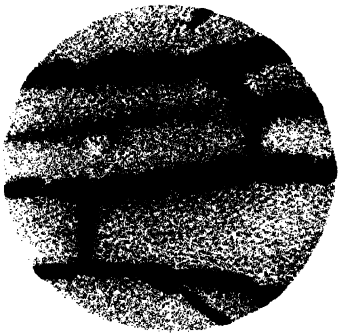
Taeniorhynchus walsinghamii. ♀). n. sp.



Taeniorhynchus tenax. (♀). Theob.

Wing Scales.

Plate V.



Trichopronomyia microannulata. (♀). n. sp.



Bancroftia albicosta. (♀). Lutz.



Culiseta absobrina. (♀). Felt.



Melanoconion melanurus. (♀). Coq.



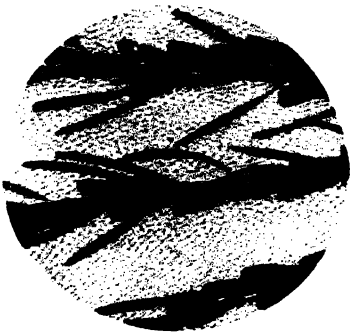
Melanoconion annulipes. (♀). Theob.



Culex vishnui. ♀. Theob.

Wing Scales.

Plate VI.



Oculeomyia sarawakii (♀). n. sp.



Pseudoheptaphlebomyia montforti. (♀). Ven



Pseudouranotaenia rowlandi. (♀). Theob.



Aedes nigrescens. ♀. n. sp.



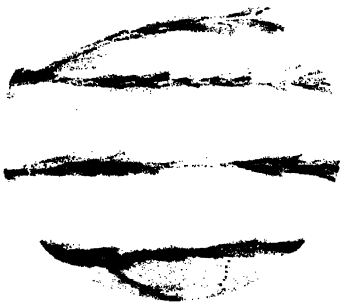
Ficalbia nigripes. (♀), n. sp.



Gualteria oswaldi. (♀). Lutz.

Wing Scales.

Plate VII.



Philodendromyia barkeri. (♀) n. sp.



Dendromyia smithii. (♀). Coq.



Dendromyia oblita. (♀). Lutz.



Dendromyia personata. (♂). Lutz.



Anisocheleonyia alboannulata. (♀). Theob.



Skusea mediofasciata. ♀). Theob.

Wing Scales.

Plate VIII.



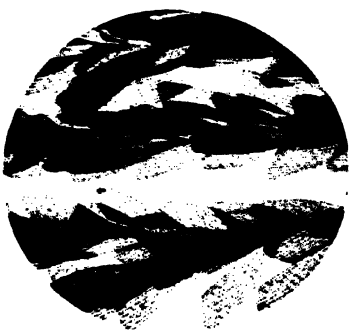
Phoniomyia quasilongirostris. (♀). n. sp.



Runchomyia frontosa. (♂). Theob.



Sabethinus intermedius. (♂) Lutz.



Sabethinus intermedius. (♀). Lutz.



Sabethinus albiprivatus. (♀). Lutz.



Sabethoides purpureus. (♀). n. sp.

Wing Scales.

Plate IX.



Leucomyia gelida. Theob.



Skusea mediofasciata. Theob.



Dendromyia personata. Lutz.

Male Genitalia.

Plate X.



Anopheles bifurcatus. Linn.



Dendromyia serrata. Lutz.



Acartomyia zammittii. Theob.



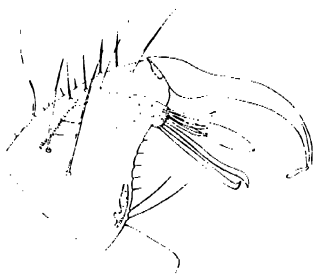
Grabhamia mariae. Serg.



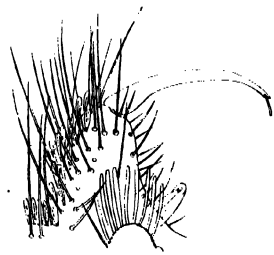
Pecomyia maculosa, n. sp.

Male Genitalia.

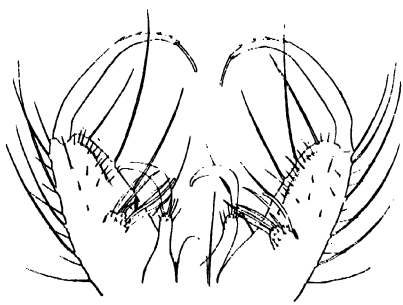
Plate XI.



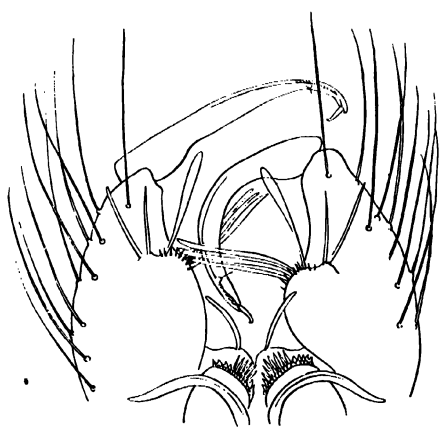
i.



ii.



iii.



iv.

i. Culex cylindricus. Theo. ii. Trichoprosopon compressum. Lutz. iii. Acartomyia zammittii. Theo. iv. Culex hirsutipalpus. Theo.

Male Genitalia



Plate XII.



ii.

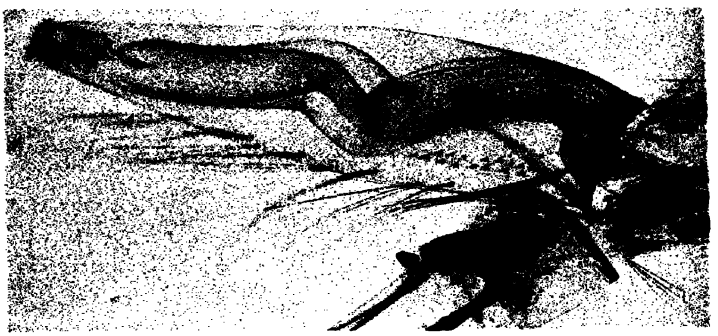
i. Culex cylindricus. Theob. (An abnormal clasper). ii. Culicada morsitans. Theob.

Male Genitalia.

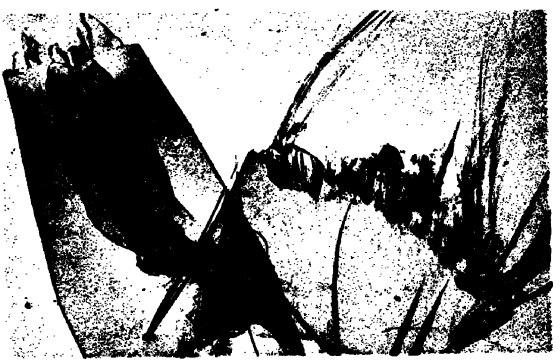
Plate XIII.



Culex crinifer. Lutz.



Carrollia irridescens. Lutz.



Megarhinus solstitialis. Lutz.

Larval Siphons.

Plate XIV.



(i.) Desvoidea ventralis. Walker.



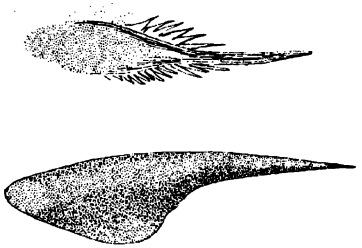
(ii.) Culex crinifer. Theobald.



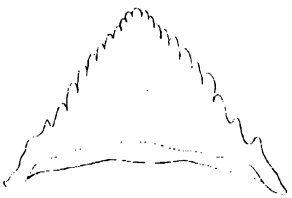
(iii.) Wyeomyia (?) leucostigma. Lutz.

Heads of Larvae.

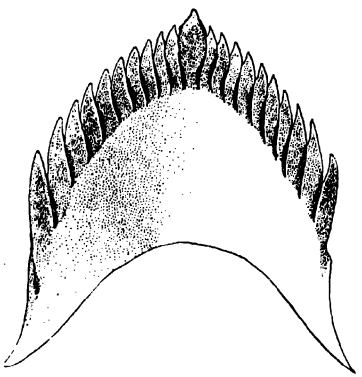
Plate XV.



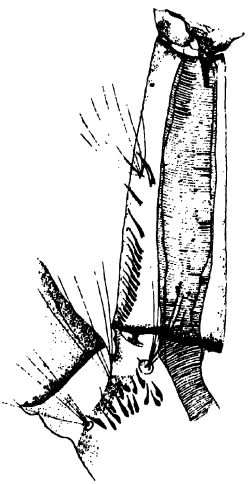
i.



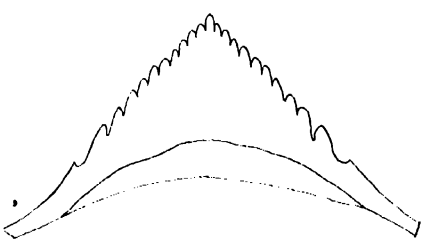
ii.



iii.



iv.

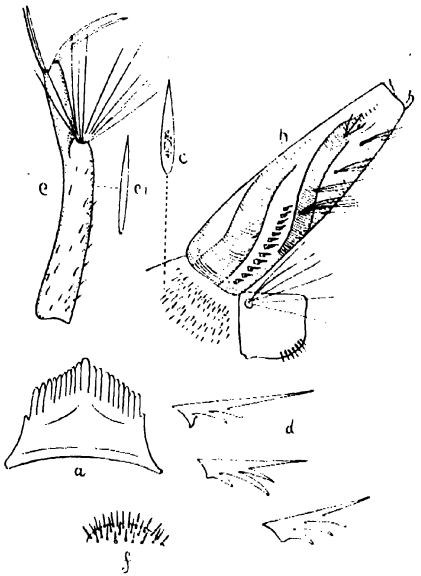


v.

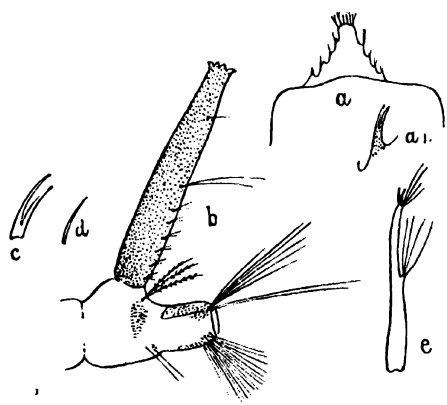
i. Comb Scales of Culex impiger. Wlk. ii. Labial plate of Culicada fitchii. Felt. iii. Labial plate of Culex pipiens. Linn. iv. Siphon of Culex impiger. Wlk. v. Labial plate of Culex impiger. Wlk.

Larval Characters.

Plate XVI.



i.



ii

i. Culex fatigans. Wied. a, labial plate; b, siphon, etc.; c, comb scale; d, pecten scales; e, antenna and enlarged spine (e¹); f, clypeus. ii. Deinocerites cancer. Theo. a, labial plate; b, siphon, etc.; c and d, scales; e, antenna (after Grabham).

Larval Characters.